UNIVERZITET U BEOGRADU
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Prepoznavanje specijalnih klasa π-lavirinata automatima

-Doktorska disertacija-

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Uvod

Problem prenošenja poslova koji iziskuju mnogo energije i vremena, na automate-robote je oduvijek pratio čovjeka. Vremenom, kada su mehanički roboti na sebe preuzeli terete vezane za fizičke poslove, pojavio se problem rasterećivanja od intelektualnih poslova, prije svega složenih izračunavanja i obrade informacija raznih oblika. Pojavili su se kompjuteri i roboti opremljeni kompjuterima. Bitno raste njihova samostalnost u radu. Danas, čovjek vjeruje njihovim rezultatima i samo s vremena na vrijeme testira tačnost njihovog rada. Pomenimo samostalno kretanje rakete koja traži cilj, mjesečevog robota koji istražuje zadato parče mjesečeve površine, podvodnog robota-izviđača rijetkih minerala, mikro-robota koji ispituje kardiovaskularni sistem čovjeka, robota koji izučava složenu grafiku hartija od vrijednosti i umjetničkih slika, i takođe je sposoban učiniti za čovjeka razumljive štampane i rukopisne tekstove. Jedan od perspektivnijih prilaza obavljanja samostalnih procesa jeste korišćenje automata. Na taj način se pojavljuju model automata u okolini i problem izučavanja njegovog ponašanja u okviru te okoline. Kao važan model pojavljuje se konačan automat u tekstualnoj sredini (u tekstu), koji krećući se u toj sredini i koristeći unutrašnju memoriju može identifikovati tu sredinu, tj. objavljuje da je prepoznao odgovarajuće slovo ili objavljuje da mu je konfiguracija nepoznata. Takvih automata za sada ima malo i oni su formirani samo u jednostavno formalizovanim slučajevima, npr. za štampana slova unaprijed zadanog oblika. Cilj našeg rada je da se izuče mogućnosti automata u prepoznavanju cifara i slova i uticaj unesenih nečitkosti u oblicima slova na njihovu prepoznatljivost.

Teorija automata je dio teorije sistema upravljanja [19], koji izučava matematičke modele pretvarača diskretne informacije, tzv. automate. Ova teorija se pojavila sredinom dvadesetog vijeka u vezi sa izučavanjem svojstava konačnih automata. Konačni automat se neformalno, može okarakterisati kao uređaj, koji ima ulazni i izlazni kanal i koji se u svakom trenutku diskretnog vremena, koji se nazivaju diskretnim trenucima, nalazi u jednom od konačno mnogo stanja. U svakom diskretnom trenutku, preko ulaznog kanala, uređaj prima ulazne signale (iz nekog konačnog skupa signala). Pri tome se zadaju : a) zakon izmjene stanja uređaja u sljedećem vremenskom trenutku u zavisnosti od ulaznog signala i njegovog stanja u prethodnom trenutku; b) vrijednost izlaznog signala (iz nekog konačnog skupa signala) uređaja u tekućem trenutku kao funkcija stanja i ulaznog signala u tom trenutku. Različiti problemi definisanja pojma konačnog automata mogu se podijeliti na grupu makroprilaza i grupu mikroprilaza. U slučaju makroprilaza interesuje nas, grubo govoreći, spoljašnje ponašanje uređaja, odnosno kako se njime realizuje prerada ulazne informacije u izlaznu informaciju i niz stanja, ne vodeći računa pri tome o njegovoj unutrašnjoj konstrukciji. Na ovaj način se dolazi do pojma apstraktnog konačnog automata. U slučaju mikroprilaza uzima se u obzir struktura uređaja, njegovo funkcionisanje, kao i veza između njegovih dijelova. Za automate se vezuju različite relacije između ulazne i izlazne informacije i stanja automata, koje se nazivaju ponašanjem automata. Na modelu apstraktnog automata može se opisati jedan od važnih oblika ponašanja automata, ponašanje automata u lavirintima, čije proučavanje, samim

tim, predstavlja određen sadržaj teorije apstraktnih automata.

Izučavanje ponašanja automata u lavirintima počinje 50-tih godina, u jednom od radova K. Šenona [10]. Od tog vremena pa do danas, na ovu temu je objavljeno stotinjak radova. Formalizovan je model Šenona [6, 7]; za lavirint se razmatrala šahovska tabla – odgovarajuća konfiguracija kvadratića u ravni ili kocki u prostoru, a u slučaju automata – konačni automat koji posmatra okolinu kvadratića na kome se nalazi i može se kretati u jednom od mogućih koordinatnih smjerova. Nametnulo se i pitanje o postojanju automata koji obilazi svaki ravanski lavirint. Na ovo pitanje dobijen je negativan odgovor. L. Budah [4] je konstruisao šahovsku zamku, no dokaz je bio jako glomazan. A. S. Podkolzin [18, 19] je znatno uprostio ovaj dokaz, dok je u radu G. Kilibarde [15] dat još jednostavniji dokaz na svega nekoliko stranica. Veliki broj rezultata je ukazivao na ograničene mogućnosti automata. No, uporedo se dobijaju primeri klasa lavirinata koje se mogu obići jednim automatom [1, 5, 6, 7, 13]. Dokazano je da se klasa lavirinata koja obuhvata sve ravanske lavirinte koji imaju rupe ograničenog dijametra, mogu obići jednim automatom [11].

Nemogućnost obilaska svih ravanskih lavirinata jednim automatom navela je na jačanje modela automata, koji bi riješio zadatak obilaska. Uveden je pojam nezavisnog sistema automata i kolektiva automata. Za razliku od nezavisnog sistema, kolektiv automata analizira lavirint uzimajući u obzir položaj svojih članova u lavirintu. Najprostiji predstavnici kolektiva su kolektivi s kamenima. Kamen je automat bez pameti i njegovo premještanje po lavirintu definišu drugi članovi kolektiva automata. U [8, 9] je dokazano da kolektiv od jednog automata i jednog kamena ne može obići sve konačne ravanske mozaične lavirinte. Kolektiv koji se sastoji od jednog automata i dva kamena, kao i kolektiv od dva automata rješava problem obilaska svih ravanskih lavirinata [2].

Osnovna problematika ponašanja automata u lavirintima može se grupisati u dvije vrste zadataka, zadatak analize i zadatak sinteze. Zadatak sinteze sastoji se u opisu automata ili kolektiva automata, koji obilaze lavirinte iz zadate klase. Zadatak analize sastoji se u opisu svih lavirinata, ili lavirinata odgovarajućeg tipa, koje obilaze zadati automati. Ovim zadacima mogu se dodati njima srodni zadaci, kao npr. obilazak specijalnih oblasti nekog lavirinta, ispitivanje zadatih svojstava lavirinta, raspoznavanje osobina geometrijskih slika, grafova, formalnih jezika i drugih diskretnih sistema.

Osnovni pojmovi i opis zadatka, razmatranog u ovom radu, dati su u prvom poglavlju. Problem razmatran u ovom radu je da se ispitaju mogućnosti prepoznavanja specijalnih klasa mozaičnih (šahovskih) lavirinata automatima. Neformalno, mozaični lavirint je povezan sistem jediničnih duži u ravni paralelnih koordinatnim osama, čiji krajevi su tačke iz Z^2, pri čemu svake dvije duži mogu imati zajedničke samo krajnje tačke.

Opis tih klasa je dat u drugom poglavlju. Elementi ovih beskonačnih klasa su tzv. π-lavirinti. *π-lavirint* je svako preslikavanje $c : Z^2 \rightarrow E^2$, ($E^2 = \{1, 0\}$), takvo da je skup $P_c = c^{-1}(\{1\})$ povezan skup (u Z^2). Skup $P_c \subseteq Z^2$ shvatamo kao skup krajeva jediničnih duži mozaičnog lavirinta. Klase su zadate analitički i u geometrijskom smislu predstavljaju cifre, odnosno figura koja se dobija ukoliko posmatramo samo granične ivice (ivica je granična ukoliko ima svojstvo "biti između tačaka skupa P_c i skupa $Z^2 \setminus P_c$") jediničnih kvadrata opisanih oko svake tačke skupa P_c, predstavlja cifru.

U trećem poglavlju je pokazano da metrika ima veliki uticaj na mogućnost prepoznavanja lavirinata automatima. Dokazano je da postoji pravougaoni lavirint L za koji ne postoji automat koji prepoznaje inicijalni lavirint L_v, za sve v iz skupa čvorova lavirinta L. S druge strane, za proizvoljan mozaični lavirint postoji automat koji ga prepoznaje polazeći iz proizvoljnog čvora tog lavirinta. U ovom poglavlju razmatraju se klase koje predstavljaju brojeve 1, 2, 3, 5, 7, tj. one klase čiji elementi su jednopovezani π-lavirinti. Konstrukcijom odgovarajućih automata, dokazuje se da postoji automat koji ih prepoznaje. Za preostale klase π-lavirinata (one koje predstavljaju cifre 0, 4, 6, 8, 9), dokazano je da ne postoji automat koji ih prepoznaje. Ovim rezultatom je ukazano na ograničene mogućnosti automata u prepoznavanju lavirinata. Uvodeći jači model automata, kolektiv automata, dokazano je da postoji kolektiv tipa (1, 1) (kolektiv koji se sastoji od jednog automata i jednog kamena) koji prepoznaje ove klase.

U posljednjoj glavi su dobijene složenosti konstruisanih automata iz trećeg poglavlja. Kako je teško izvršiti provjeru rada ovih automata, izvršena je programska realizacija konstruisanih automata. Programska realizacija koja "simulira" rad kolektiva automata izvršena je tako da promjenljiva u programu pamti tačku na kojoj je "postavljen" automat kamen. Implementacija je izvršena na programskom jeziku C++.

Dodatak I i Dodatak II su nastavci trećeg poglavlja. U njima su dati opisi konstruisanih automata i kolektiva automata čiji opisi nijesu dati u trećem poglavlju zbog preglednosti teksta.

Sve teoreme i leme, formulisane u disertaciji su rezultati autora disertacije.

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1. Osnovni pojmovi i opis zadatka

U ovoj glavi ćemo definisati pojmove koji su neophodni za formulisanje našeg zadatka. Svi uvedeni pojmovi mogu se naći u [18, 19] kao i u [15, 17, 20].

Neka je G = (V, E) povezan digraf, bez petlji, gdje je V - skup čvorova i E - skup orijentisanih grana digrafa G. Digraf G = (V, E) je *simetričan* ako zajedno sa orijentisanom granom (v_1, v_2) sadrži i orijentisanu granu (v_2, v_1), $(v_1, v_2) \in$ E. Par $< v_1, v_2 > = \{(v_2, v_1), (v_1, v_2)\}$ nazivamo granom digrafa G.

Neka je $X_{\alpha \{\alpha \in I\}}$, indeksirana familija skupova X_α. Tada, za svako $\alpha \in$ I sa p_α označimo funkciju projekcije proizvoda $\prod_{\alpha \in I} X_\alpha$ na α-ti član proizvoda X_α.

Neka su Ω i Σ disjunktne azbuke slova ω i σ, pri čemu $\Omega \setminus \Sigma$ sadrži prazan simbol λ i neka je dat digraf G = (V, E). Trojku L = (G, f_L, h_L), gdje je f_L: V $\to \Omega$ preslikavanje kojim su čvorovima digrafa G pridružena slova iz azbuke Ω i h_L: E $\to \Sigma$ preslikavanje kojim su orijentisanim granama digrafa G pridružena slova iz azbuke Σ tako da, ako za γ_1, $\gamma_2 \in$ E važi $p_1(\gamma_1) = p_1(\gamma_2)$, tada je $h_L(\gamma_1) \neq h_L(\gamma_2)$, nazivamo *lavirintom*. Skup čvorova V i skup grana E digrafa G predstavlja skup čvorova i skup grana lavirinta L i nadalje ćemo ih označavati sa V(L) i E(L), redom.

Lavirint L sa izdvojenim skupom čvorova $V_0 = \{v_1, v_2, ..., v_n\}$, koje nazivamo početnim ili inicijalnim čvorovima lavirinta L, nazivamo inicijalnim i označavamo sa $L_{v_1...v_n}$ ili L_{V_0} ili (L; V_0). Ukoliko je u lavirintu L_{V_0} izdvojen još jedan skup čvorova V_1, koje nazivamo krajnjim ili izlaznim skupom čvorova lavirinta L_{V_0}, $V_0 \cap V_1 = \varnothing$, lavirint L ćemo označavati sa $L_{V_0}^{V_1}$ ili (L; V_0; V_1).

Označimo sa $\Theta(\Omega, \Sigma)$ klasu svih lavirinata sa skupom oznaka čvorova Ω i skupom oznaka grana Σ.

Neka je dat lavirint L = ((V, E), f_L, h_L). *Podlavirint lavirinta L, obrazovan skupom čvorova* V' $\subset$ V, je lavirint L' = ((V', E'), $f_{L'}$, $h_{L'}$), gdje je E' = E $\cap$ V' $\times$ V' (E' je podskup skupa E koji sadrži sve one parove iz E koji su obrazovani samo od elemenata skupa V'), za sve $(u, v) \in$ E' važi $h_{L'}(u, v) = h_L(u, v)$ i za sve $v \in$ V' važi $f_{L'}(v) = f_L(v)$.

Neka je $\check{E}^n = \{e_1, e_2, ..., e_n\}$ skup baznih jediničnih vektora n-dimenzionalnog Euklidovog prostora $\mathbf{R}^n$. Sa $\overline{E}^n$ označimo skup $\{e_1, e_2, ..., e_n, -e_1, -e_2, ..., -e_n\}$. U slučaju n = 2, umjesto oznaka baznih vektora i, j i vektora –i, –j koristićemo oznake e, n, w, s, redom.

Lavirint L = (G, f_L, h_L) $\in \Theta(\Omega, \Sigma)$, gdje je G simetričan digraf, nazivamo *n-dimenzionalnim lavirintom*, n $\geq$ 2, ako:

1) $\Sigma = \overline{E}^n$ i $\Omega = \{\lambda\}$;
2) za sve $u, v \in$ V(L), ako je $(u, v) \in$ E(L), tada je $h_L(v, u) = -(h_L(u, v))$.

Nadalje, za lavirint L = (G, f_L, h_L) umjesto oznake $h_L(\gamma)$, $\gamma \in$ E(L), koristićemo oznaku $|\gamma|_L$ i ukoliko je iz konteksta jasno o kom lavirintu je riječ, koristićemo oznaku $|\gamma|$.

Za n-dimenzionalne lavirinte L_1 i L_2 kažemo da su *slabo izomorfni* ako postoji bijekcija g: $V(L_1) \to V(L_2)$, takva da $(u, v) \in E(L_1)$ ako i samo ako $(g(u), g(v)) \in E(L_2)$, i pri tome ako jedan od lavirinata ima ulaz (ima ulaz i izlaz), to i drugi lavirint ima ulaz (ima ulaz i izlaz) i pri tome $g(v_0^1) = v_0^2$, gdje je v_0^1 ulaz lavirinta L_1, a v_0^2 ulaz lavirinta L_2 (i pri tome $g(v_0^1) = v_0^2$, gdje je v_0^1 ulaz lavirinta L_1, a v_0^2 ulaz lavirinta L_2 i $g(v_1^1) = v_1^2$ gdje je v_1^1 izlaz lavirinta L_1, a v_1^2 izlaz lavirinta L_2). Ako je još $|(u, v)|_{L_1} = |(g(u), g(v))|_{L_2}$, za sve $(u, v) \in E(L_1)$, tada kažemo da su lavirinti L_1 i L_2 *izomorfni*. Mi nećemo razlikovati izomorfne lavirinte i pisaćemo $L_1 = L_2$.

Neka su M, N $\in \mathbf{R}^n$, M$\neq$N, i $e \in \overline{E}^n$. Kažemo da je vektor $\overrightarrow{MN}$ *e*-vektor ako je

$\overrightarrow{MN} = \alpha e$ i $\alpha > 0$. Skup **T** duži iz $\mathbf{R}^n$ nazivamo *n-konfiguracijom*, ako svake dvije duži iz tog skupa mogu imati ne više od jedne zajedničke tačke, pri čemu, ako ona postoji, tada je ona krajnja tačka obje te duži.

n-dimenzionalni lavirint L, gdje je $V(L) \subseteq \mathbf{R}^n$, nazivamo *n-dimenzionalnim pravougaonim lavirintom*, ako:

1) za sve $u, v \in V(L)$ ako je $(u, v) \in E(L)$ tada je vektor $\overrightarrow{uv}$ $|(u, v)|$-vektor;

2) skup duži $\mathbf{T} = \{ \overline{uv} | (u, v) \in E(L)\}$ jeste n-konfiguracija.

n-dimenzionalni lavirint L, izomorfan nekom n-dimenzionalnom pravougaonom lavirintu, naziva se *kvazipravougaonim*.

Neka je L n-dimenzionalni pravougaoni lavirint. Figuru $\overline{L} = \bigcup_{(u,v) \in E(L)} \overline{uv}$ u $\mathbf{R}^n$ nazivamo *realizacijom* n-dimenzionalnog pravougaonog lavirinta. Na slici 1 je data realizacija 2-dimenzionalnog pravougaonog lavirinta L, zadatog sa:

Skup čvorova $V(L) = \{v_i | i = 1,2, ...,8\}$, gdje su $v_1 = (-0.8, 2.0)$, $v_2 = (0.5, 2.0)$, $v_3 = (2.8, 2.0)$, $v_4 = (0.5, 1.5)$, $v_5 = (2.5, 0.5)$, $v_6 = (3.3, 0.5)$, $v_7 = (2.5, -0.2)$, $v_8 = (4.5, -0.2)\}$, skup grana $E(L) = \{< v_1, v_2>, < v_2, v_3>, < v_2, v_4>, < v_4, v_5>, < v_5, v_6>, < v_5, v_7>, < v_7, v_8>\}$ i preslikavanje kojim se orijentisanim granama pridružuju oznake iz azbuke $\{e, n, w, s\}$, je dato sa $| v_1, v_2|_L = e$, $| v_2, v_3|_L = e$, $| v_2, v_4|_L = s$, $| v_4, v_5|_L = e$, $| v_5, v_6|_L = e$, $| v_5, v_7|_L = s$, $| v_7, v_8|_L = e$.
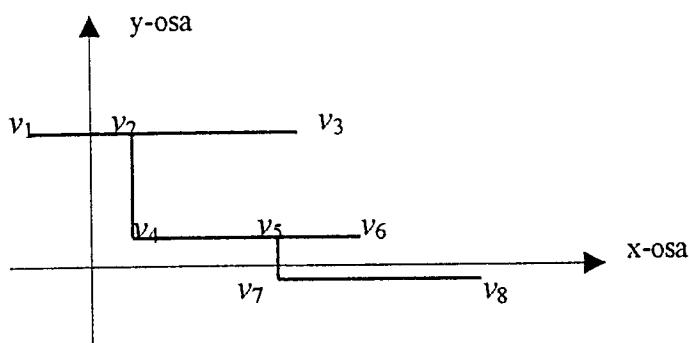

slika 1.

Neka je $\mathbf{Z}^n$ cjelobrojna rešetka u $\mathbf{R}^n$. Ako je $V(L) \subseteq \mathbf{Z}^n$, tada n-dimenzionalni pravougaoni lavirint L nazivamo *n-dimenzionalni cjelobrojni lavirint*, a n-dimenzionalni

cjelobrojni lavirint L nazivamo *n-dimenzionalni mozaični lavirint* ako je $T = \{\overline{uv} \mid (u, v) \in E(L)\}$ – skup duži dužine 1.

Za čvor v n-dimenzionalnog mozaičnog lavirinta L kažemo da je *otvoren* u L, ako postoji beskonačni n-dimenzionalni mozaični lavirint L_1 takav da $\overline{L} \cap \overline{L_1} = \{v\}$. Ako je čvor v_1 otvoren u L, to n-dimenzionalni mozaični lavirint $L_{v_0}^{v_1}$ nazivamo *n-dimenzionalnim pravilnim lavirintom*. Na slici 2 su date realizacije dva 2-dimenzionalna mozaična lavirinta od kojih je jedan a) pravilan a drugi b) to nije.

a)   b)
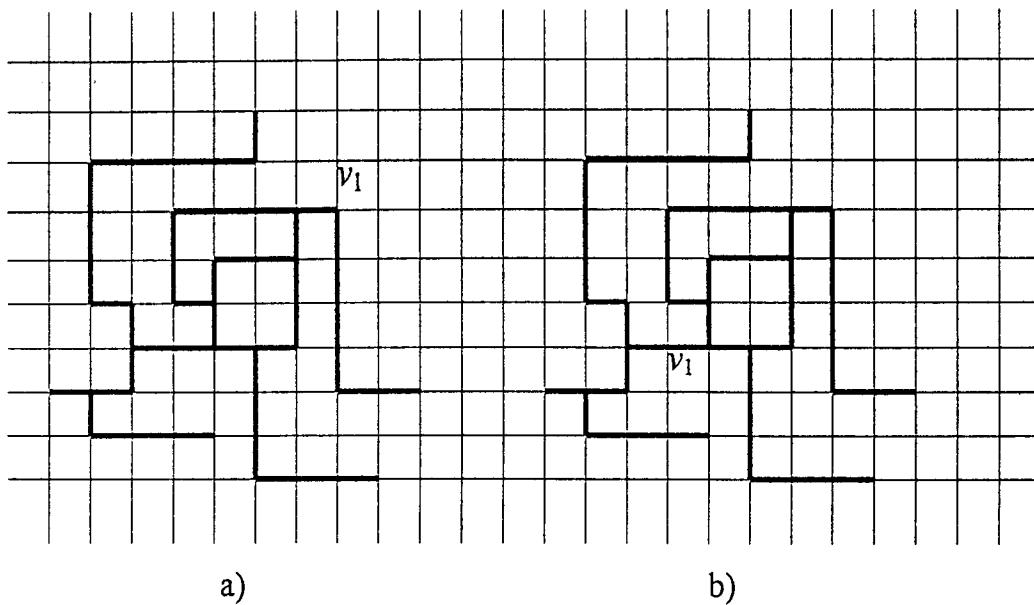
slika 2.

Kroz tačke skupa $\mathbf{Z}^n$ povucimo sve prave paralelne koordinatnim osama. Dobijena figura jeste realizacija n-dimenzionalnog pravougaonog lavirinta, koji ćemo označiti sa $\mathbf{Z}^n$. Skup čvorova tog lavirinta je skup $\mathbf{Z}^n$. Očevidno da n-dimenzionalni mozaični lavirint možemo definisati kao simetrični povezani dio (označeni) lavirinta $\mathbf{Z}^n$, a n-dimenzionalni mozaični lavirint $L_{v_0}^{v_1}$ je pravilan ukoliko postoji put, koji vodi preko grana lavirinta $\mathbf{Z}^n$, čiji je početak v_1, koji se dalje ne presijeca sa čvorovoma i granama lavirinta $L_{v_0}^{v_1}$ i koji odlazi proizvoljno daleko od $L_{v_0}^{v_1}$. *n-dimenzionalni šahovski lavirint* jeste bilo koji podlavirint lavirinta $\mathbf{Z}^n$.

Neka je L 2-dimenzionalni pravougaoni lavirint. Skup $\mathbf{R}^2 \setminus \overline{L}$ je otvoren i u opštem slučaju nepovezan skup. Lavirint L je (r + 1)-*svezan*, ako skup $\mathbf{R}^2 \setminus \overline{L}$ ima r ograničenih komponenti povezanosti. Ako je L 2-dimenzionalni šahovski lavirint i $U_1, U_2, ..., U_r$ sve komponente povezanosti skupa $\mathbf{R}^2 \setminus \overline{L}$, tada svaki neprazan podskup D oblika $U_i \cap \mathbf{Z}^2$, ($1 \le i \le r$) nazivamo *šahovskom rupom* lavirinta L. Ako je skup D konačan, šahovsku rupu nazivamo konačnom, a u suprotnom beskonačnom. 2-dimenzionalni šahovski lavirint L nazivamo (r + 1)-*svezanim šahovskim lavirintom* ako u njemu postoji tačno r konačnih šahovskih rupa, $r \in \mathbf{N}$. Na slici 2 su dati 3-svezani 2-dimenzionalni pravougaoni lavirinti.

Apstraktni konačni automat (od sada, automat) je petorka $A = (A, Q, B, \varphi, \psi)$, gdje su A, B i Q konačne azbuke, koje se redom nazivaju ulazna azbuka, izlazna azbuka i skup stanja; $\varphi : Q \times A \rightarrow Q$ funkcija prelaza i $\psi : Q \times A \rightarrow B$ funkcija izlaza. Automat A kod kojeg je izdvojeno tzv. početno stanje $q \in Q$ nazivamo inicijalnim automatom i označavamo sa A_q. Neka su A* i B* skupovi svih riječi $a = a(1)a(2)...a(n)$ i $b = b(1)b(2)...b(n)$ nad azbukama A i B, redom. Funkcionisanje automata A_q je preslikavanje $F(A_q) : A* \rightarrow B*$, definisano rekurentno:

$$\begin{cases} q(1) = q, \\ q(t+1) = \varphi(q(t), a(t)), \\ b(t) = \psi(q(t), a(t)). \end{cases}$$

Predmet našeg izučavanja jeste ponašanje automata u lavirintima. Automat A je *dopustiv* za klasu lavirinata $\Theta(\Omega, \Sigma)$ ako se ulazna azbuka sastoji od slova a oblika $(w, \{\sigma_1, \sigma_2, ..., \sigma_n\})$, gdje je $w \in \Omega$ i $\{\sigma_1, \sigma_2, ..., \sigma_n\} \subseteq \Sigma$, i izlazna azbuka je $\Sigma \cup \{k\}$, $k \notin \Sigma$, i pri tome je uvijek $\psi(q, a) \in p_2(a) \cup \{k\}$. Klasu svih takvih automata označimo sa $At(\Omega, \Sigma)$.

Neka je $A_{q_0} \in At(\Omega, \Sigma)$ i $L_{v_0} \in \Theta(\Omega, \Sigma)$. Ponašanje automata A_{q_0} u lavirintu L_{v_0} interpretirajmo na sljedeći način. Pretpostavlja se da se proces odvija u trenucima, koji se numerišu brojevima 1, 2, 3, ..., (vremenski intervali među ovim trenucima ne moraju biti iste dužine). Automat A_{q_0} se postavlja na čvor v_0 lavirinta L_{v_0}. Pretpostavimo da se u nekom momentu automat A_{q_0} nalazi u čvoru v lavirinta L_{v_0} i u stanju q. Kažemo da on posmatra označenu zvijezdu, obrazovanu orijentisanim granama koje izlaze iz tog čvora. U tom momentu njegovo ulazno slovo je par, obrazovan oznakom čvora i skupom oznaka zvijezde. U sljedećem momentu, ako je $\psi(q, a) \neq k$, tada automat prelazi u čvor , u koji vodi orijentisana garana označena sa $\psi(q, a)$, a ako je $\psi(q, a) = k$, to on ostaje na mjestu, i uvijek prelazi u stanje $\varphi(q, a)$. Na ovaj način automat ostvaruje kretanje po lavirintu. Funkcionisanje automata A_{q_0} u lavirintu L_{v_0} možemo definisati kao ponašanje automata A_{q_0} u lavirintu L_{v_0}. Niz parova

$\pi\left(A_{q_0}; L_{v_0}\right) = (q_0, v_0), (q_1, v_1), ...$ nazivamo *ponašanjem automata* A_{q_0} *u lavirintu* L_{v_0}, ako je v_{i+1} čvor lavirinta L_{v_0}, u koji automat, nalazeći se u stanju q_i, prelazi iz čvora v_i, a q_{i+1} - stanje , u koje pri tom prelazi automat A_{q_0}. Niz $|(v_0, v_1)|, |(v_1, v_2)|, ...$ označimo sa $Tr\left(A_{q_0}, L_{v_0}\right)$, početak dužine s niza $Tr\left(A_{q_0}, L_{v_0}\right)$ sa $Tr\left(A_{q_0}, L_{v_0}; s\right)$. Ako za neko $u \in V(L_{v_0})$ postoji $q \in Q_{A_{q_0}}$ tako da par (q, u) pripada $\pi\left(A_{q_0}; L_{v_0}\right)$, tada kažemo da automat A_{q_0} obilazi čvor u lavirinta L_{v_0}. Označimo skup svih čvorova, koje obilazi automat A_{q_0} u lavirintu L_{v_0} sa $Int\left(A_{q_0}, L_{v_0}\right)$, tj. $Int\left(A_{q_0}, L_{v_0}\right) = \bigcup_{i=0}^{\infty}\{v_i\}$.

Neka je $L_{v_0} \in \Theta(\Omega, \Sigma)$ i $A_{q_0} \in At(\Omega, \Sigma)$. Ako je $Int\left(A_{q_0}, L_{v_0}\right) = V(L_{v_0})$, tada kažemo da automat A_{q_0} obilazi lavirint L_{v_0}, a inače da je lavirint L_{v_0} zamka za automat A_{q_0}.

Neka je $V_1 \subseteq V(L_{v_0})$. Tada V_1-*ponašanjem* automata A_{q_0}, nazivamo podniz $(q_{i_0}, v_{i_0}), (q_{i_1}, v_{i_1}), \dots$ niza $\pi\left(A_{q_0}; L_{v_0}\right)$, dobijen iz niza $\pi\left(A_{q_0}; L_{v_0}\right)$ izbacivanjem svih parova (q_i, v_i), za koje $v_i \notin V_1$. Za sve $V_1 \subseteq V(L_{v_0})$ definišimo vrijednosti

$$st(\pi, V_1), pl(\pi, V_1), dr(\pi, V_1), tm(\pi, V_1),$$

gdje je $\pi = \pi\left(A_{q_0}; L_{v_0}\right)$, na sljedeći način: Ako postoji t, t > 0, takvo da $v_t \in V_1$ i za sve t', 0 < t' < t, $v_{t'} \notin V_1$, tada

$$st(\pi, V_1) = q_t, pl(\pi, V_1) = v_t, dr(\pi, V_1) = \psi(q_t, [v_t]_L), tm(\pi, V_1) = t,$$

a u suprotnom vrijednosti $st(\pi, V_1), pl(\pi, V_1), dr(\pi, V_1), tm(\pi, V_1)$ nijesu definisane.

Pored ponašanja automata u lavirintu možemo posmatrati i ponašanje sistema automata u lavirintu. Neka je $L_{v_1, \dots, v_n} \in \Theta(\Omega, \Sigma)$ i neka je zadat sistem dopustivih automata $S = \left(A_{q_1}^1, A_{q_2}^2, \dots, A_{q_n}^n\right)$. Ako pod ponašanjem tog sistema u $L_{v_1, \dots, v_n}$ podrazumjevamo niz ponašanja $\left(\pi\left(A_{q_1}^1; L_{v_1}\right), \pi\left(A_{q_2}^2; L_{v_2}\right), \dots, \pi\left(A_{q_n}^n; L_{v_n}\right)\right)$, to takav sistem nazivamo *nezavisnim*, a samo ponašanje - *ponašanjem nezavisnog sistema automata*. Ako za neko i, $1 \leq i \leq n$, $Int\left(A_{q_i}^i, L_{v_i}\right) = V(L_{v_1, \dots, v_n})$, kažemo da nezavisan sistem automata S obilazi lavirint $L_{v_1, \dots, v_n}$, a ako $\bigcup_{i=1}^{n} Int\left(A_{q_i}^i, L_{v_i}\right) = V(L_{v_1, \dots, v_n})$, kažemo da nezavisan sistem automata S S-obilazi lavirint $L_{v_1, \dots, v_n}$; u suprotnom kažemo da je lavirint $L_{v_1, \dots, v_n}$ zamka odnosno S-zamka za nezavisan sistem S.

Posmatrajmo jednu drugu varijantu ponašanja sistema automata $S = \left(A_{q_1}^1, A_{q_2}^2, \dots, A_{q_n}^n\right)$ u lavirintu $L_{v_1, \dots, v_n} \in \Theta(\Omega, \Sigma)$. Označimo sa $Q_{A_{q_i}^i}$ skup stanja, sa ψ_i i φ_i funkcije izlaza i prelaza, redom, automata $A_{q_i}^i$, $1 \leq i \leq n$. Ako se ulazna azbuka automata $A_{q_i}^i$, $1 \leq i \leq n$, sastoji od simbola a oblika $(w, \{u_1, \dots, u_{i-1}, u_{i+1}, \dots, u_n\}, \{\sigma_1, \sigma_2, \dots, \sigma_m\})$, gdje je $w \in \Omega$, $u_j \in Q_{A_{q_j}^j} \cup \{\lambda\}$, $j \in \{1, \dots, i-1, i+1, \dots, n\}$, i $\{\sigma_1, \sigma_2, \dots, \sigma_m\} \subseteq \Sigma$, a izlazna azbuka je skup $\Sigma \cup \{k\}$, $k \notin \Sigma$, i pri tome uvijek $\psi_i(q, a) \in p_3(a) \cup \{k\}$, $q \in Q_{A_{q_i}^i}$, tada sistem S nazivamo *kolektivom*. Funkcionisanje kolektiva $S = \left(A_{q_1}^1, A_{q_2}^2, \dots, A_{q_n}^n\right)$ u lavirintu $L_{v_1, \dots, v_n}$ možemo interpretirati njegovim ponašanjem u lavirintu $L_{v_1, \dots, v_n}$ na sljedeći način. Automat $A_{q_i}^i$ se u početnom trenutku nalazi u čvoru

v_i, $1 \leq i \leq n$, lavirinta L. Pretpostavimo da se u nekom momentu t automat $A_{q_i}^i$ nalazi u čvoru v_i^t i u stanju q_i^t. Njegovo ulazno slovo a_i^t u tom momentu jeste trojka koju čine: oznaka čvora, skup stanja automata koji se nalaze u čvoru v_i^t, osim stanja u kojem se nalazi automat $A_{q_i}^i$, i skupa oznaka zvijezde koju obrazuju sve orijentisane grane koje izlaze iz čvora v_i^t. U sljedećem trenutku, ako je $\psi_i(q_i^t, a_i^t) \neq k$, to automat prelazi u čvor u koji vodi orijentisana grana označena sa $\psi_i(q_i^t, a_i^t)$, a ako je $\psi_i(q_i^t, a_i^t) = k$, automat ostaje na mjestu, i automat prelazi u stanje $\varphi_i(q_i^t, a_i^t)$. Na ovaj način automat $A_{q_i}^i$ ostvaruje kretanje po lavirintu, prelazeći neki put. Niz parova (q_i^0, v_i^0), (q_i^1, v_i^1),... nazivamo ponašanjem automata $A_{q_i}^i$ iz kolektiva S u lavirintu $L_{v_1...v_n}$, ako $(q_i^0, v_i^0) = (q_i, v_i)$, v_i^{t+1} je čvor u kojem automat $A_{q_i}^i$ prelazi iz čvora v_i^t, nalazeći se u stanju q_i^t, a q_i^{t+1} je novo stanje u koje taj automat prelazi. Tada kažemo, automat $A_{q_i}^i$ obilazi čvorove v_i^0, v_i^1,... i skup ovih čvorova označimo sa $Int\left(S, L_{v_1...v_n}; i\right)$. Niz

$$\pi\left(S, L_{v_1...v_n}\right) = \left(q_1^0,...,q_n^0, \quad v_1^0,...,v_n^0\right), \left(q_1^1,...,q_n^1, \quad v_1^1,...,v_n^1\right),...,$$ takav da je niz (q_i^0, v_i^0), (q_i^1, v_i^1),... ponašanje automata $A_{q_i}^i$ iz kolektiva S u lavirintu $L_{v_1...v_n}$, nazivamo *ponašanjem* *kolektiva* S *u* *lavirintu* $L_{v_1...v_n}$. Neka je

$$Int\left(S, L_{v_1...v_n}\right) = \bigcup_{i=1}^{n} Int\left(S, L_{v_1...v_n}; i\right).$$ Ako je $Int(S, L_{v_1...v_n}) = V(L_{v_1...v_n})$, tada kažemo da kolektiv S obilazi lavirint $L_{v_1...v_n}$; a inače, $L_{v_1...v_n}$ je zamka za kolektiv S. Lavirint L je jaka zamka za kolektiv S ako je za sve $v_1,...,v_n \in V(L)$ lavirint $L_{v_1...v_n}$ zamka za S. Kolektiv S jako obilazi lavirint L ako za sve $v_1,...,v_n \in V(L)$ kolektiv S obilazi lavirint $L_{v_1...v_n}$.

Uočimo neke automate $A_{q_{i_1}}^{i_1},..., A_{q_{i_m}}^{i_m}$, $1 \leq i_1 < ... < i_m \leq n$, kolektiva $S = \left(A_{q_1}^1, A_{q_2}^2,..., A_{q_n}^n\right)$. Automate $A_{q_{i_1}}^{i_1},..., A_{q_{i_m}}^{i_m}$ nazivamo *kamenima u kolektivu* S, ako važe sljedeći uslovi:

a) automat $A_{q_{i_j}}^{i_j}$, $1 \leq j \leq m$, ima samo jedno stanje q_{i_j};

b) ako za neki ulaz $a = \left(w, \{u_1,...,u_{i_l-1}, u_{i_l+1},...,u_n\}, \{\sigma_1,...,\sigma_s\}\right)$ automata $A_{q_{i_l}}^{i_l}, 1 \leq l \leq m$, važi $\psi_{i_l}(q_{i_l}, a) = \sigma_k$, $1 \leq k \leq s$, to postoji $j \neq i_l$, $1 \leq j \leq n$, $1 \leq l \leq m$, takav da $u_j \neq \lambda$ i tada je $\psi_j(u_j, a') = \sigma_k$, gdje je $a' = \left(w, \{u_1',...,u_{j-1}', u_{j+1}',...,u_n'\}, \{\sigma_1,...,\sigma_s\}\right)$, pri čemu $u_i' = u_i$ za sve $i \neq i_l, j$, $1 \leq i \leq n$, a $u_{i_l}' = q_{i_l}$.

Drugim riječima, automat kamen **K** je automat koji ima samo jedno stanje i ukoliko "ne stoji u mjestu" (na izlazu daje simbol $\sigma \in \Sigma$) to postoji automat **A** koji se nalazi "na istom

mjestu" i "vuče" ga za sobom (isto na izlazu daje simbol $\sigma \in \Sigma$). Automat kamen se još naziva i "marker".

Kolektiv S sa m automata $A_{q_{i_1}}^{i_1}$,..., $A_{q_{i_m}}^{i_m}$, koji su kameni, naziva se *kolektivom iz n-m automata s m kamenova (kolektiv tipa* (n-m, m)).

Osnovna problematika ponašanja automata u lavirintima može se grupisati u dvije vrste zadataka, zadatak analize i zadatak sinteze. Zadatak sinteze sastoji se u opisu automata ili kolektiva automata, koji obilaze lavirinte iz zadate klase. Zadatak analize sastoji se u opisu svih lavirinata, ili lavirinata odgovarajućeg tipa, koje obilaze zadati automati. Oba zadatka su izučavana u radovima velikog broja autora [20].

U okviru ovih zadataka razmatraju se i zadaci ispitivanja raznih svojstava lavirinata, a takođe i raspoznavanje svojstava geometrijskih figura.

Poznato je da za svaki automat postoji 2-dimenzionalni mozaični konačni lavirint, kojeg on ne može obići [3, 4, 18, 19]. U [14] je pokazano da postoji opšta 2-dimenzionalna mozaična zamka za sve automate iz proizvoljnog konačnog skupa automata.

Ukoliko je v čvor lavirinta L, tada sa $[v]_L$ označimo skup $\{|u| \mid p_1(u) = v, u \in E(L)\}$. Ako je iz konteksta jasno o kom lavirintu se radi, koristićemo oznaku $[v]$.

Pored početnog stanja nekog automata $A_q = (A, Q, B, \varphi, \psi, q)$, možemo izdvojiti i skup *zaključnih* odnosno *finalnih* stanja $Q_F \subseteq Q$. Neka je $Q_F = \{q_{F_0}, q_{F_1}\}$. Kažemo da automat A_q (kolektiv $S = (A_q, K)$ tipa (1, 1)) *prepoznaje lavirint* L_v ako pri kretanju automata A_q u lavirintu L_v automat prelazi u finalno stanje q_{F_1}, a za lavirint $L'_v \neq L_v$ automat A_q prelazi u finalno stanje q_{F_0}. Neka je C klasa inicijalnih lavirinata. Kažemo da automat A_q (kolektiv $S = (A_q, K)$ tipa (1, 1)) *prepoznaje klasu* C ako za svaki lavirint $L_v \in C$, pri kretanju automata A_q u tom lavirintu automat prelazi u finalno stanje q_{F_1}, a za svaki lavirint $L_v \notin C$, pri kretanju automata A_q u tom lavirintu automat prelazi u finalno stanje q_{F_0}.

Iz definicije šahovskog lavirinta je jasno da je za njegovo određivanje dovoljno znati skup njegovih čvorova. Da se pojam šahovskog lavirinta ne bi sveo samo na njegove čvorove čime bi se izgubila semantika pojma lavirinta, G. Kilibarda je u radovima [13, 14] uveo pojam π-lavirinta. U ovim radovima je data i definicija pojma automat-pješak. Pristupimo definisanju ovih pojmova .

Neka su a = (a_1, a_2) i b = (b_1, b_2) proizvoljni elementi iz Z^2. Kažemo da su a i b *(slabo) susjedni*, ako je $(\|a - b\| < 2)$ $\|a - b\| = 1$, $\|a - b\| = [(a_1 - b_1)^2 + (a_2 - b_2)^2]^{\frac{1}{2}}$. Niz tačaka a = $p_0, p_1, ..., p_m$ = b iz Z^2 naziva se *(slab) lanac*, koji povezuje tačke a i b, ako su tačke p_{i-1} i p_i (slabo) susjedne za svako $1 \leq i \leq m$. Skup $V \subseteq Z^2$ je *(slabo) povezan* ako za sve a, b $\in$ V postoji (slab) lanac iz V koji ih povezuje. *Komponenta (slabe) povezanosti* skupa V, je svaki maksimalno (slabo) povezan podskup skupa V.

π-lavirint je svako preslikavanje c : $Z^2 \rightarrow E^2$, ($E^2 = \{1, 0\}$), takvo da je skup $P_c = c^{-1}(\{1\})$ povezan skup. Ako je p_0-proizvoljna tačka iz P_c, tada par (c, p_0) nazivamo π-lavirintom s početkom (ulazom) p_0. π-lavirint nazivamo konačnim (beskonačnim), ako je skup P_c konačan (beskonačan). Ubuduće ćemo pod π-lavirintom podrazumjevati konačni π-lavirint. *Rupa* π-lavirinta je proizvoljna komponenta slabe povezanosti skupa $Z^2 \setminus P_c$.

Označimo sa $\mathbf{0} = (0, 0)$ nula vektor. Neka je $V = (p_1, p_2, ..., p_{k-1})$ uređen niz različitih nenultih cijelobrojnih vektora i $A = (A, Q, B, \varphi, \psi, q_0)$ inicijalni automat kod koga je $B = V' \subseteq \{0, p_1, p_2, ..., p_{k-1}\}$ i $A = (E^2)^k$. Par (A, V) nazivamo pješakom, a V – vidokrugom tog pješaka. Pješak (A, V) je regularan pješak, ako je funkcija izlaza ψ takva da za proizvoljno $q \in Q$ i $a = (a_1, ..., a_k) = (1, a_2, ..., a_k) \in (E^2)^k$ iz toga što $\psi(q, a) = p_i$, za neko $0 \le i \le k-1$, slijedi da $a_{i+1} = 1$; $p_0 = \mathbf{0}$.

Neka su dati regularan pješak (A, V) i π-lavirint (c, p_0); $V = (p_1, p_2, ..., p_{k-1})$, $A = (A, Q, B, \varphi, \psi, q_0)$. Uređen niz V za svako $z \in \mathbf{Z}^2$ određuje uređen niz $V(z) = (z, z + p_1, z + p_2, ..., z + p_{k-1})$. Ponašanjem pješaka (A, V) u π-lavirintu (c, p_0) je niz $\pi(A, V; c, p_0)$:

$$(z_0, q_0, a_0, b_0), (z_1, q_1, a_1, b_1), ...$$

gdje $z_0 = p_0$, $z_{i+1} = z_i + b_i$, $q_{i+1} = \varphi(q_i, a_i)$, $a_i = c[V(z_i)] = (c(z_i), c(z_i + p_1), ..., c(z + p_{k-1}))$ i $b_i = \psi(q_i, a_i)$. Jasno, ako je pješak (A, V) regularan, tada je $z_t \in P_c$ za svako $t = 0, 1, ...$

Pojmovi obilaska i prepoznavanja π-lavirinata su slični već uvedenim pojmovima obilaska i prepoznavanja lavirinta, te ih nećemo ovdje uvoditi.

Mi ćemo razmatrati samo regularne pješake za koje je $V = ((1, -1), (1, 0), (1, 1), (0, -1), (0, 1), (-1, -1), (-1, 0), (-1, 1))$ i $B = \{e, n, w, s\} \cup \{0\}$. Zbog ovoga ćemo umjesto pješak (A, V) pisati pješak $\mathbf{A}$.

Naš zadatak je opis specijalnih klasa π-lavirinata i ispitivanje mogućnosti sinteze regularnih pješaka ili kolektiva automata, koji će prepoznavati te klase.

Pristupimo definiciji klasa mozaičnih lavirinata čije prepoznavanje jeste naš zadatak.

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2. Klase π-lavirinata određene ciframa

U ovoj glavi postoji deset paragrafa. U svakom od ovih paragrafa je definisana jedna klasa π-lavirinata, koja je pridružena različitim zapisima jedne od deset cifara. Ove klase π-lavirinata ćemo označiti sa C_i, i = 0, 1, ..., 9. Elemente ovih klasa ćemo konstruisati pomoću elemenata devet osnovnih familija $\Phi_j \subseteq Z^2$, j = 1, ..., 9.

Definišimo pomenute osnovne familije, a potom i pomenutih deset klasa.

Neka je P = {K $\subseteq Z^2$| K povezan skup takav da je Z^2 \ K povezan skup, K konačan skup}.

Neka je granica skupa K∈P skup ∂K={z ∈ K | z je slabo susjedan bar jednoj tački iz Z^2 \ K}. Oko svake tačke z = (z_1, z_2)∈ ∂K opišimo kvadrat kv_z čija je dužina stranice 1. Njegove stranice su (slika 3):

$\alpha = \{x = (x_1, x_2) \in \mathbf{R}^2 \mid z_1 - 1/2 \leq x_1 \leq z_1 + 1/2, x_2 = z_2 + 1/2\}$,

$\beta = \{x = (x_1, x_2) \in \mathbf{R}^2 \mid z_1 - 1/2 \leq x_1 \leq z_1 + 1/2, x_2 = z_2 - 1/2\}$,

$\chi = \{x = (x_1, x_2) \in \mathbf{R}^2 \mid x_1 = z_1 - 1/2, \ z_2 - 1/2 \leq x_2 \leq z_2 + 1/2\}$,

$\delta = \{x = (x_1, x_2) \in \mathbf{R}^2 \mid x_1 = z_1 + 1/2, \ z_2 - 1/2 \leq x_2 \leq z_2 + 1/2\}$,
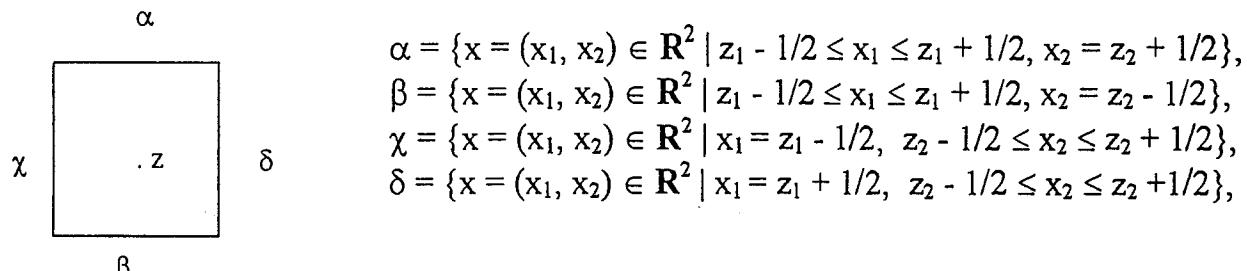
slika 3.

Stranica α, β, χ, δ kvadrata kv_z, z ∈ K, ima svojstvo "biti između tačaka skupa K i skupa $\mathbf{Z}^2$ \ K" ako tačke $(z_1, z_2 + 1)$, $(z_1, z_2 - 1)$, $(z_1 - 1, z_2)$, $(z_1 + 1, z_2)$, ne pripadaju skupu K, redom.

Neka je st_z skup stranica kvadrata kv_z koje imaju osoboinu " biti između tačaka skupa K i skupa $\mathbf{Z}^2$ \ K". Figura $F_K = \bigcup_{z \in \partial K} st_z$ je pravougli poligon.

Neka je K ⊂ $\mathbf{Z}^2$ konačan povezan skup. *Najniža najdesnija tačka* (ND) skupa K je tačka z = (z_1, z_2)∈ K takva da za sve a = (a_1, a_2) ∈ K, $z_2 < a_2$ ili ako je $z_2 = a_2$ tada je $z_1 > a_1$. *Najniža najlijevija tačka* (NL) skupa K je tačka z = (z_1, z_2)∈ K takva da za sve a = (a_1, a_2) ∈ K, $z_2 < a_2$ ili ako je $z_2 = a_2$ tada je $z_1 < a_1$. *Najviša najdesnija tačka* (VD) skupa K je tačka z = (z_1, z_2)∈ K takva da za sve a = (a_1, a_2) ∈ K, $z_2 > a_2$ ili ako je $z_2 = a_2$ tada je $z_1 > a_1$. *Najviša najlijevija tačka* (VL) skupa K je tačka z = (z_1, z_2)∈ K takva da za sve a = (a_1, a_2) ∈ K, $z_2 > a_2$ ili ako je $z_2 = a_2$ tada je $z_1 < a_1$.

Najdesnija najniža tačka (DN) skupa K je tačka z = (z_1, z_2)∈ K takva da za sve a= (a_1, a_2) ∈ K, $z_1 > a_1$ ili ako je $z_1 = a_1$ tada je $z_2 < a_2$. *Najlijevija najniža tačka* (LN) skupa K je tačka z = (z_1, z_2)∈ K takva da za sve a = (a_1, a_2) ∈ K, $z_1 < a_1$ ili ako je $z_1 = a_1$ tada je $z_2 < a_2$.

Neka je (S)* - skup svih riječi α = α(1)α(2)...α(k), k ≥ 4, nad azbukom S = {-1, 1}. Definišimo preslikavanje *f* : P → (S)* na sljedeći način: Neka je P ∈ P. Polazeći od najniže najdesnije tačke poligona F_P i obilazeći ga u pozitivnom smjeru, svakom tjemenu

poligona F_P pridružimo -1 ili 1 u zavisnosti od toga da li je ugao kod tog tejemena $-\pi/2$ ili $\pi/2$, redom.

Familije skupova (slika 4):

$$\Phi_1 = \left\{ P \in \mathbf{P} \mid \|P\| \geq 2, f(P) = \left(-1(-1,1)^n - 1 - 1(1,-1)^k - 1\right), k, n \geq 0 \right\}$$

$$\Phi_2 = \left\{ P \in \mathbf{P} \mid \|P\| \geq 2, f(P) = \left(-1(1,-1)^n - 1 - 1(1,-1)^k - 1\right), k, n \geq 0 \right\}$$

$$\Phi_3 = \left\{ P \in \mathbf{P} \mid \|P\| \geq 2, f(P) = \left(-1(-1,1)^n - 1 - 1(-1,1)^k - 1\right), k, n \geq 0 \right\}$$

$$\Phi_4 = \left\{ P \in \mathbf{P} \mid \|P\| \geq 2, f(P) = \left(-1(1,-1)^n - 1 - 1(-1,1)^k - 1\right), k, n \geq 0 \right\}$$

$$\Phi_5 = \left\{ P \in \mathbf{P} \mid \|P\| \geq 2, f(P) = \left(-1 - 1 - 1(1,-1)^k - 1\right), k \geq 0 \right\}$$

$$\Phi_6 = \left\{ P \in \mathbf{P} \mid \|P\| \geq 2, f(P) = \left(-1(-1,1)^k - 1 - 1 - 1\right), k \geq 0 \right\}$$

$$\Phi_7 = \left\{ P \in \mathbf{P} \mid \|P\| \geq 2, f(P) = \left(-1 - 1 - 1(-1,1)^k - 1\right), k \geq 0 \right\}$$

$$\Phi_8 = \left\{ P \in \mathbf{P} \mid \|P\| \geq 2, f(P) = \left(-1(1,-1)^k - 1 - 1 - 1\right), k \geq 0 \right\}$$

$$\Phi_9 = \left\{ P \in \mathbf{P} \mid \|P\| \geq 2, f(P) = (-1 - 1 - 1 - 1) \right\},$$

gdje je $(a, b)^n = \underbrace{(ab)(ab)...(ab)}_{n}$, $n \in N$, nazivamo *osnovnim familijama.*

(-1(-1, 1)⁴-1-1(1, -1)³-1)   (-1(1, -1)²-1-1(1, -1)³-1)   (-1(-1, 1)²-1-1(-1, 1)²-1)   (-1(1, -1)²-1-1(-1, 1)³-1)

(-1-1-1(1, -1)³-1)   (-1(-1, 1)²-1-1-1)   (-1-1-1(-1, 1)²-1)   (-1(1, -1)²-1-1-1)   (-1-1-1-1)
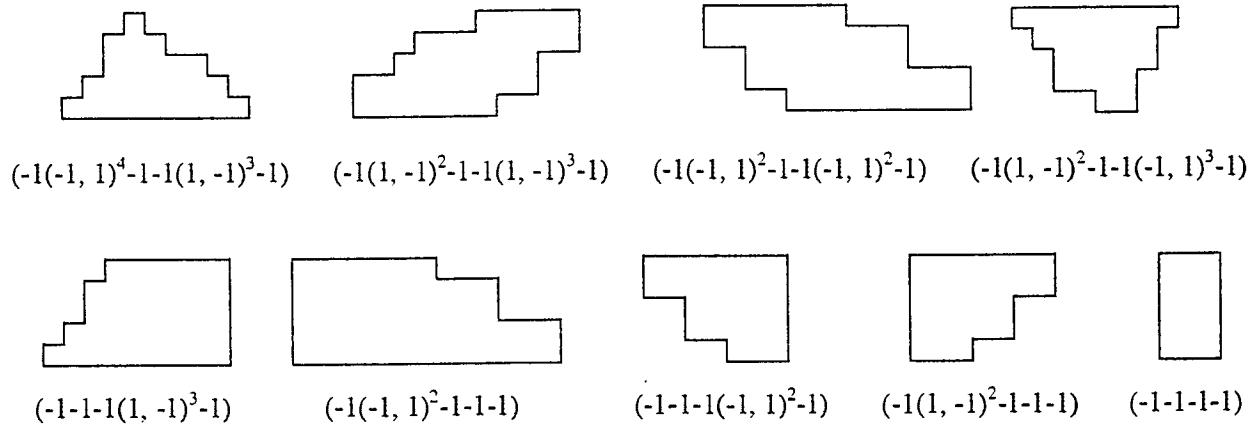
slika 4.

Ukoliko su $z_j = (x_j, y_j) \in \mathbf{Z}^2$, $j = 1, 2, 3, 4$, takvi da $y_2 = y_3$ i $y_1 = y_4$, tada označimo sa $A_{\Phi_i}^{z_1, z_2, z_3, z_4} = \{K \in \Phi_i \mid z_1, z_2, z_3, z_4$ ND, VD, VL, NL tačka skupa K, redom$\}$, $i \in \{1, ..., 9\}$.

Prilikom definisanja klasa C_i, $i = 0, 1, ..., 9$, date su i slike na kojima se jasno vidi prisutnost osnovnih elemenata (elementi osnovnih familija) u konstruisanju elemenata ovih klasa. π-lavirint c iz klase C_i je takav da je skup $P_c = c^{-1}(\{1\})$ "sastavljen" od elemenata iz skupa $\{\sigma \in \Phi_j \mid j = 1, ..., 9\}$, $i = 0, 1, ..., 9$, tj. P_c se može horizontalnim

dužima izdjeliti na podskupove k_i, i = 1, ..., p, tako da $P_c = \bigcup\limits_{i=1}^{p} k_i$ i za sve i $\in$ {1, ..., p}

postoji j $\in$ {1, ..., 9} tako da $k_i \in \Phi_j$.

§ 2.1. *Klasa C_0 π-lavirinata*

Da bi definisali elemente klase C_0 π-lavirinata, poslužimo se figurom sa slike 5. Tačke $z_i = (x_i, y_i) \in Z^2$, i = 1, 2,...,16, sa ove figure imaju svojstva 0).

$$0) \begin{cases} y_9 = y_{16} = y_{11} = y_2, \\ x_9 \leq x_{16} < x_{11} - 1, \quad x_{11} \leq x_2, \\ y_4 > y_3 > y_2, \\ y_7 = y_{14} = y_{13} = y_4, \\ x_7 \leq x_{14} < x_{13} - 1, \quad x_{13} \leq x_4, \\ y_7 > y_8 > y_9 \end{cases}$$

slika 5.
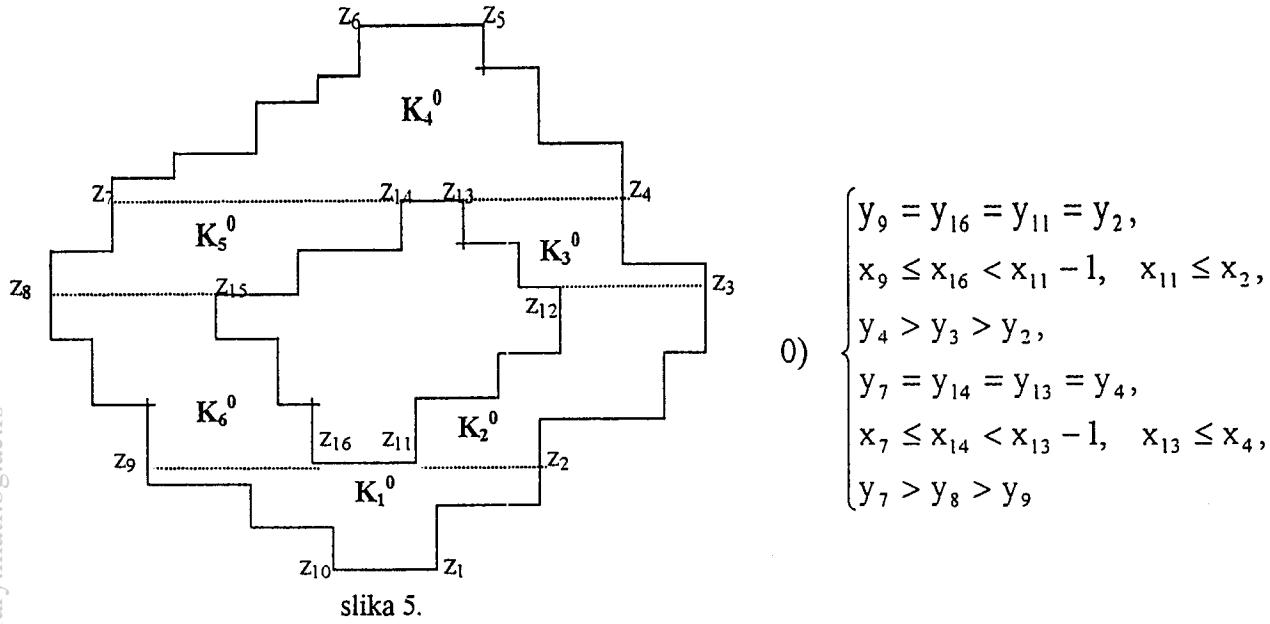
Neka je,

$$K_0^{\{z_i\}_{i=\overline{1,16}}} = \{K \in P | K = K_1^0 \cup K_2^0 \cup K_3^0 \cup K_4^0 \cup K_5^0 \cup K_6^0, K_1^0 \in A_{\Phi_4}^{z_1, z_2, z_9, z_{10}},$$

$$K_2^0 \in A_{\Phi_2}^{z_2, z_3, z_{12}, z_{11}}, K_3^0 \in A_{\Phi_3}^{z_3, z_4, z_{13}, z_{12}}, K_4^0 \in A_{\Phi_1}^{z_4, z_5, z_6, z_7}, K_5^0 \in A_{\Phi_2}^{z_{15}, z_{14}, z_7, z_8},$$

$$K_6^0 \in A_{\Phi_3}^{z_{16}, z_{15}, z_8, z_9},$$

$$\left(x_1 = x_{10}\right) \Rightarrow \left(z_1 + (1,1) \in K_1^0 \wedge z_1 + (-1,1) \in K_1^0\right),$$

$$\left(z_3 + (0,1) \notin K_3^0 \wedge z_3 + (0,-1) \notin K_2^0\right) \Rightarrow \left(z_3 + (-1,1) \in K_3^0 \vee z_3 + (-1,-1) \in K_2^0\right),$$

$$\left(x_5 = x_6\right) \Rightarrow \left(z_5 + (1,-1) \in K_4^0 \wedge z_5 + (-1,-1) \in K_4^0\right),$$

$$\left(z_8 + (0,1) \notin K_5^0 \wedge z_8 + (0,-1) \notin K_6^0\right) \Rightarrow \left(z_8 + (1,1) \in K_5^0 \vee z_8 + (1,-1) \in K_6^0\right)\},$$

gdje tačke $z_i = (x_i, y_i) \in Z^2$, i = 1, 2,...,16, imaju svojstva 0). *Klasa C_0 π-lavirinata* je

$$C_0 = \{c: Z^2 \to E^2 | c^{-1}(\{1\}) = K \in K_0^{\{z_i\}_{i=\overline{1,16}}}, z_i \in Z^2, \ i = \overline{1,16}, \text{ zadovoljavaju uslove 0)}\}.$$

§ 2.2. *Klasa C_1 π-lavirinata*

Da bi definisali elemente klase C_0 π-lavirinata, poslužimo se figurom sa slike 6. Tačke $z_i = (x_i, y_i) \in Z^2$, $i = 1, 2,...,10$, sa ove figure imaju svojstva 1).
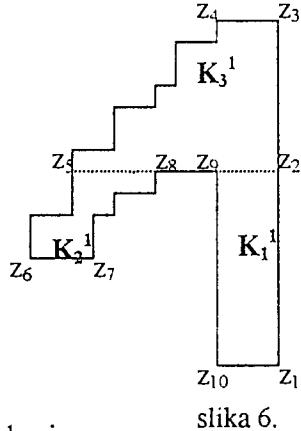
$$1) \begin{cases} y_5 = y_8 = y_9 = y_2, \\ x_5 \le x_8 < x_9 - 1, \\ x_9 \le x_2, \\ y_2 > y_1, \\ y_7 < y_8. \end{cases}$$

slika 6.

Neka je,

$$K_1^{\{z_i\}_{i=\overline{1,10}}} = \{K \in P | K = K_1^1 \cup K_2^1 \cup K_3^1, \quad K_1^1 \in A_{\Phi_9}^{z_1,z_2,z_9,z_{10}}, K_2^1 \in A_{\Phi_2}^{z_2,z_3,z_4,z_5},$$

$$K_3^1 \in A_{\Phi_5}^{z_7,z_8,z_5,z_6}, (x_3 = x_4) \Rightarrow (z = z_3 + (-1,-1) \in K_3^1)\},$$

gdje tačke $z_i = (x_i, y_i) \in Z^2$, $i = 1, 2,...,10$, imaju svojstva 1). *Klasa C_1 π-lavirinata* je

$$C_1 = \left\{ c: Z^2 \to E^2 | c^{-1}(\{1\}) = K \in K_1^{\{z_i\}_{i=\overline{1,10}}}, \{z_i\} \in Z^2 \ i = \overline{1,10}, \text{zadovoljavaju uslove} \quad 1) \right\}.$$

§ 2.3. *Klasa C_2 π-lavirinata*

Da bi definisali elemente klase C_2 π-lavirinata, poslužimo se figurom sa slike 7. Tačke $z_i = (x_i, y_i) \in Z^2$, $i = 1, 2,...,17$, sa ove figure imaju svojstva 2).
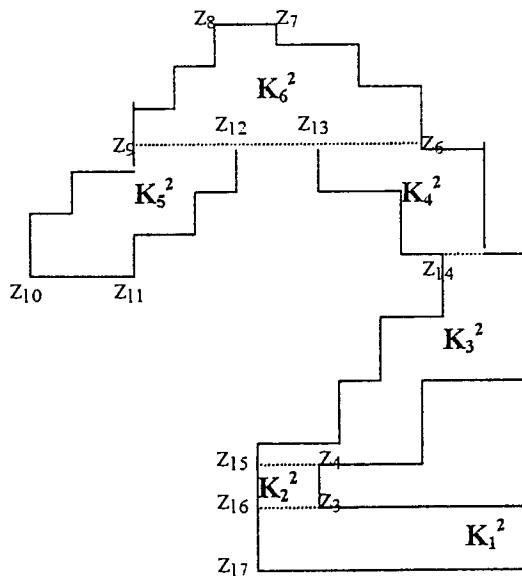
$$2) \begin{cases} x_{16} \le x_3 < x_2, \quad x_9 \le x_{11} < x_{13} - 1, \\ x_{13} \le x_6, \\ y_4 - 1 > y_3, \quad y_5 > y_4, \quad y_6 > y_5, \\ y_{16} = y_3 = y_2, \\ y_9 = y_{11} = y_{13} = y_6 \end{cases}$$

slika 7.

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Neka je,

$$K_2^{\{z_i\}_{i=\overline{1,17}}} = \{K \in P \mid K = K_1^2 \cup K_2^2 \cup K_3^2 \cup K_4^2 \cup K_5^2 \cup K_6^2, K_1^2 \in A_{\Phi_9}^{z_1,z_2,z_{16},z_{17}},$$

$$K_2^2 \in A_{\Phi_9}^{z_3,z_4,z_{15},z_{16}}, K_3^2 \in A_{\Phi_2}^{z_4,z_5,z_{14},z_{15}}, K_4^2 \in A_{\Phi_3}^{z_5,z_6,z_{13},z_{14}}, K_5^2 \in A_{\Phi_5}^{z_{11},z_{12},z_9,z_{10}},$$

$$K_6^2 \in A_{\Phi_1}^{z_6,z_7,z_8,z_9},$$

$$\left(z_5 + (0,1) \notin K_4^2 \wedge z_5 + (0,-1) \notin K_3^2\right) \Rightarrow \left(z_5 + (-1,-1) \in K_3^2 \vee z_5 + (-1,1) \in K_4^2\right),$$

$$z_{15} + (0,1) \notin K_3^2, \quad (x_7 = x_8) \Rightarrow \left(z_7 + (1,-1) \in K_6^2 \wedge z_7 + (-1,-1) \in K_6^2\right)\},$$

gdje tačke $z_i = (x_i, y_i) \in Z^2$, $i = 1, 2,...,17$, imaju svojstva 2). *Klasa C_2 π-lavirinata* je

$$C_2 = \{c : Z^2 \to E^2 \mid c^{-1}(\{1\}) = K \in K_2^{\{z_i\}_{i=\overline{1,17}}}, \quad z_i \in Z^2, \quad i = \overline{1,17}, \quad \text{zadovoljavaju uslove 2)}\}.$$

§ 2.4. *Klasa C_3 π-lavirinata*

Da bi definisali elemente klase C_3 π-lavirinata, poslužimo se figurom sa slike 8. Tačke $z_i = (x_i, y_i) \in Z^2$, $i = 1, 2,...,26$, sa ove figure imaju svojstva 3).
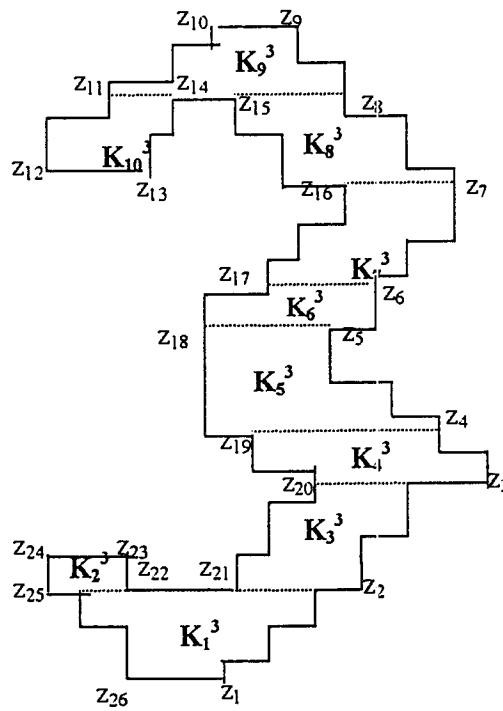
3)
$$\begin{cases} y_{22} = y_{22} = y_{21} = y_2, \\ x_{25} \le x_{22} < x_{21} - 1, \quad x_{21} \le x_2, \\ y_{23} > y_{22}, \quad y_4 > y_3 > y_2, \\ x_{17} = x_{18} = x_{19}, \\ y_8 > y_7 > y_6, \\ y_{11} = y_{14} = y_{15} = y_8, \\ x_{11} \le x_{14} < x_{15} - 1, x_{15} \le x_8, \\ y_{14} > y_{13} \end{cases}$$

slika 8.

Neka je,

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$$K_3^{\{z_i\}_{i=\overline{1,26}}} = \{K \in P | K = K_1^3 \cup K_2^3 \cup K_3^3 \cup K_4^3 \cup K_5^3 \cup K_6^3 \cup K_7^3 \cup K_8^3 \cup K_9^3 \cup K_{10}^3,$$

$$K_1^3 \in A_{\Phi_4}^{z_1,z_2,z_{25},z_{26}}, K_2^3 \in A_{\Phi_3}^{z_{22},z_{23},z_{24},z_{25}}, K_3^3 \in A_{\Phi_2}^{z_2,z_3,z_{20},z_{21}}, K_4^3 \in A_{\Phi_3}^{z_3,z_4,z_{19},z_{20}},$$

$$K_5^3 \in A_{\Phi_6}^{z_4,z_5,z_{18},z_{19}}, K_6^3 \in A_{\Phi_8}^{z_5,z_6,z_{17},z_{18}}, K_7^3 \in A_{\Phi_2}^{z_6,z_7,z_{16},z_{17}}, K_8^3 \in A_{\Phi_3}^{z_7,z_8,z_{15},z_{16}},$$

$$K_9^3 \in A_{\Phi_1}^{z_8,z_9,z_{10},z_{11}}, K_{10}^3 \in A_{\Phi_2}^{z_{11},z_{12},z_{13},z_{14}},$$

$$\left(x_1 = x_{26}\right) \Rightarrow \left(z_1 + (1,1) \in K_1^3 \wedge z_1 + (-1,1) \in K_1^3\right),$$

$$\left(x_9 = x_{10}\right) \Rightarrow \left(z_9 + (1,-1) \in K_9^3 \wedge z_9 + (-1,-1) \in K_9^3\right),$$

$$\left(z_3 + (0,1) \notin K_4^3 \wedge z_3 + (0,-1) \notin K_3^5\right) \Rightarrow \left(z_3 + (-1,1) \in K_4^5 \vee z_3 + (-1,-1) \in K_3^5\right),$$

$$\left(z_3 + (0,1) \notin K_4^3 \wedge z_3 + (0,-1) \notin K_3^3\right) \Rightarrow \left(z_3 + (-1,1) \in K_4^3 \vee z_3 + (-1,-1) \in K_3^3\right),$$

$$\left(z_7 + (0,1) \notin K_8^3 \wedge z_7 + (0,-1) \notin K_7^3\right) \Rightarrow \left(z_7 + (-1,1) \in K_8^3 \vee z_7 + (-1,-1) \in K_7^3\right)\},$$

gdje tačke $z_i = (x_i, y_i) \in Z^2$, $i = 1, 2,...,26$, imaju svojstva 3). *Klasa C_3 π-lavirinata* je

$$C_3 = \{c: Z^2 \to E^2 | c^{-1}(\{1\}) = K \in K_3^{\{z_i\}_{i=\overline{1,26}}}, z_i \in Z^2, \ i = \overline{1,26}, \ \text{zadovoljavju uslove 3)}\}.$$

§ 2.5. *Klasa C_4 π-lavirinata*

Da bi definisali elemente klase C_4 π-lavirinata, poslužimo se figurom sa slike 9. Tačke $z_i = (x_i, y_i) \in Z^2$, $i = 1, 2,...,17$, sa ove figure imaju svojstva 4).

$$4) \begin{cases} y_{11} = y_{12} = y_2 = y_3, \\ y_{10} = y_{17} = y_{14} = y_5 = y_4, \\ y_9 = y_{16} = y_{15} = y_6, \\ x_2 > x_1, \quad x_{11} < x_{12} - 1, \quad x_{12} \leq x_2 < x_3, \\ x_{10} \leq x_{17} < x_{14} - 1, \quad x_{14} \leq x_5 < x_4, \\ x_9 \leq x_{16} < x_{15} - 1, \quad x_{15} \leq x_6, \\ y_2 > y_1, \quad y_6 > y_5 + 1, \quad y_{16} > y_{17} + 1, \\ x_{12} = x_{14}, \quad x_2 = x_5 \end{cases}$$
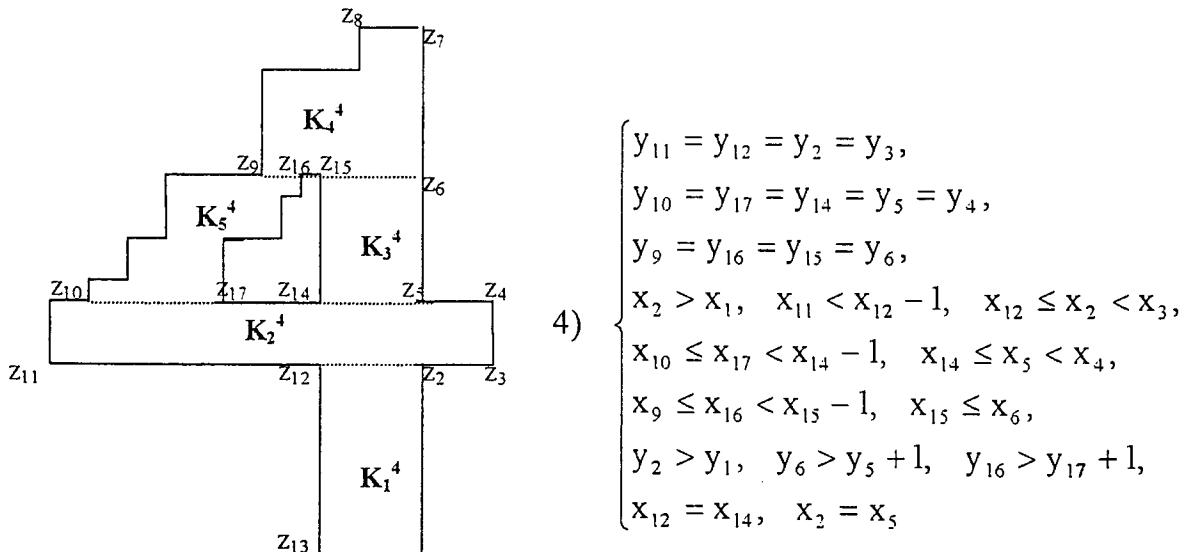
slika 9.

Neka je,

$$K_4^{\{z_i\}_{i=\overline{1,17}}} = \{K \in P | K = K_1^4 \cup K_2^4 \cup K_3^4 \cup K_4^4 \cup K_5^4, K_1^4 \in A_{\Phi_9}^{z_1,z_2,z_{12},z_{13}}, K_2^4 \in A_{\Phi_9}^{z_3,z_4,z_{10},z_{11}},$$

$$K_3^4 \in A_{\Phi_9}^{z_5,z_6,z_{15},z_{14}}, K_4^4 \in A_{\Phi_5}^{z_6,z_7,z_8,z_9}, K_5^4 \in A_{\Phi_2}^{z_{17},z_{16},z_9,z_{10}},$$

$$\left(x_7 = x_8\right) \Rightarrow \left(z_7 + (1,-1) \in K_4^4\right)\},$$

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gdje tačke $z_i = (x_i, y_i) \in Z^2$, $i = 1, 2,..., 17$, imaju svojstva 4). *Klasa C_4 π-lavirinata* je

$$C_4 = \{c: Z^2 \to E^2 | c^{-1}(\{1\}) = K \in K_4^{\{z_i\}_{i=\overline{1,17}}}, z_i \in Z^2, i = \overline{1,17}, \text{zadovoljavaju uslove 4)}\}.$$

§ 2.6. *Klasa C_5 π-lavirinata*

Da bi definisali elemente klase C_5 π-lavirinata, poslužimo se figurom sa slike 10. Tačke $z_i = (x_i, y_i) \in Z^2$, $i = 1, 2,...,27$, sa ove figure imaju svojstva 5).
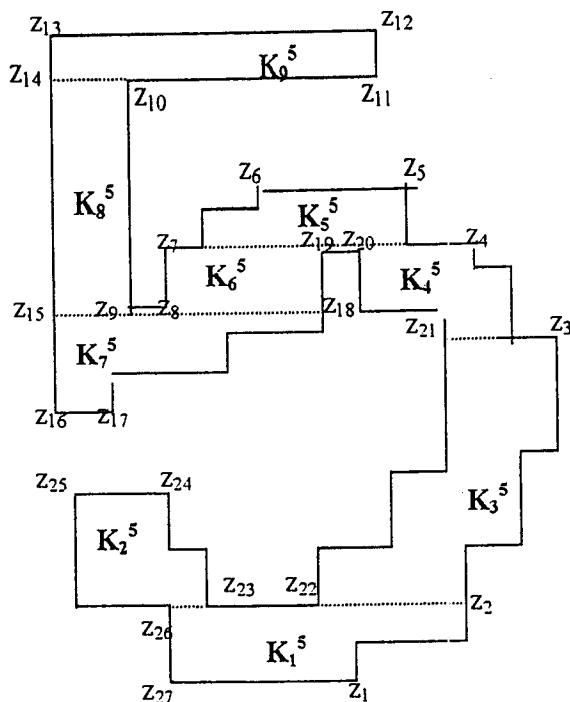
$$5) \begin{cases} y_{26} = y_{23} = y_{22} = y_2, \\ x_{26} \leq x_{23} < x_{22} - 1, x_{22} \leq x_2, \\ y_2 < y_3 < y_4, \\ y_7 = y_{19} = y_{20} = y_4, \\ x_7 \leq x_{19} < x_{20} - 1, \quad x_{20} \leq x_4, \\ y_{18} < y_{19}, \\ y_{15} = y_9 = y_8 = y_{18}, \\ x_{15} \leq x_9 < x_8 - 1, \\ x_8 \leq x_{18}, \quad y_8 < y_{10}, \\ y_{14} = y_{10} = y_{11}, \quad x_{10} < x_{11} \end{cases}$$

slika 10.

Neka je,

$$K_5^{\{z_i\}_{i=\overline{1,27}}} = \{K \in P | K = K_1^5 \cup K_2^5 \cup K_3^5 \cup K_4^5 \cup K_5^5 \cup K_6^5 \cup K_7^5 \cup K_8^5 \cup K_9^5,$$

$$K_1^5 \in A_{\Phi_4}^{z_1, z_2, z_{26}, z_{27}}, K_2^5 \in A_{\Phi_3}^{z_{23}, z_{24}, z_{25}, z_{26}}, K_3^5 \in A_{\Phi_2}^{z_2, z_3, z_{21}, z_{22}}, K_4^5 \in A_{\Phi_2}^{z_3, z_4, z_{20}, z_{21}},$$

$$K_5^5 \in A_{\Phi_1}^{z_4, z_5, z_6, z_7}, K_6^5 \in A_{\Phi_2}^{z_{18}, z_{19}, z_7, z_8}, K_7^5 \in A_{\Phi_8}^{z_{17}, z_{18}, z_{15}, z_{16}}, K_8^5 \in A_{\Phi_9}^{z_9, z_{10}, z_{14}, z_{15}},$$

$$K_9^5 \in A_{\Phi_9}^{z_{11}, z_{12}, z_{13}, z_{14}},$$

$$(x_1 = x_{27}) \Rightarrow (z_1 + (1,1) \in K_1^5 \wedge z_1 + (-1,1) \in K_1^5),$$

$$(z_3 + (0,1) \notin K_4^5 \wedge z_3 + (0,-1) \notin K_3^5) \Rightarrow (z_3 + (-1,1) \in K_4^5 \vee z_3 + (-1,-1) \in K_3^5),$$

$$(x_5 = x_6) \Rightarrow (z_5 + (1,-1) \in K_5^5 \wedge z_5 + (-1,-1) \in K_5^5),$$

$$(x_{16} = x_{17}) \Rightarrow (z_{17} + (1,1) \in K_7^5)\},$$

gdje tačke $z_i = (x_i, y_i) \in Z^2$, $i = 1, 2,..., 27$, imaju svojstva 5). *Klasa C_5 π-lavirinata* je

$$C_5 = \{c: Z^2 \to E^2 | c^{-1}(\{1\}) = K \in K_5^{\{z_i\}_{i=\overline{1,27}}}, z_i \in Z^2, i = \overline{1,27}, \text{zadovoljavaju uslove 5)}\}.$$

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§ 2.7. *Klasa C_6 π-lavirinata*

Da bi definisali elemente klase C_6 π-lavirinata, poslužimo se figurama sa slika 11, 12, 13.

Tačke $z_i = (x_i, y_i) \in Z^2$, $i = 1, 2,...,28$, sa figure na slici 11 imaju svojstva 6.1).

slika 11.
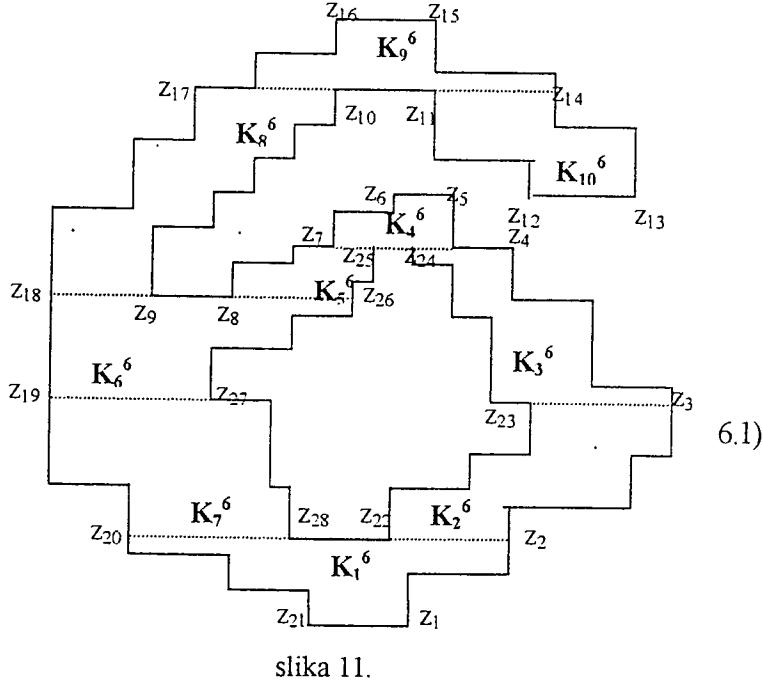
$$6.1)\begin{cases} y_{20} = y_{28} = y_{22} = y_2, \\ x_{20} \le x_{28} < x_{22} - 1, x_{22} \le x_2, \\ y_4 > y_3 > y_2, \\ y_7 = y_{25} = y_{24} = y_4, \\ x_7 \le x_{25} < x_{24} - 1, x_{24} \le x_4, \\ y_7 > y_8, \\ y_{18} = y_9 = y_8 = y_{26}, \\ x_{18} \le x_9 < x_8 - 1, x_8 \le x_{26}, \\ y_{20} > y_{19} > x_{18}, x_{18} = x_{19}, \\ y_{17} > y_{18} - 1, \\ y_{17} = y_{10} = y_{11} = y_{14}, \\ x_{17} \le x_{10} < x_{11} - 1, x_{11} \le x_{14}, \\ y_{14} > y_{13} \end{cases}$$

Neka je,

$$K_{6.1}^{\{z_i\}_{i=\overline{1,28}}} = \{K \in P | K = K_1^6 \cup K_2^6 \cup K_3^6 \cup K_4^6 \cup K_5^6 \cup K_6^6 \cup K_7^6 \cup K_8^6 \cup K_9^6 \cup K_{10}^6,$$

$$K_1^6 \in A_{\Phi_4}^{z_1, z_2, z_{20}, z_{21}}, K_2^6 \in A_{\Phi_2}^{z_2, z_3, z_{23}, z_{22}}, K_3^6 \in A_{\Phi_3}^{z_3, z_4, z_{24}, z_{23}}, K_4^6 \in A_{\Phi_1}^{z_4, z_5, z_6, z_7},$$

$$K_5^6 \in A_{\Phi_2}^{z_{26}, z_{25}, z_7, z_8}, K_6^6 \in A_{\Phi_8}^{z_{27}, z_{26}, z_{18}, z_{19}}, K_7^6 \in A_{\Phi_3}^{z_{28}, z_{27}, z_{19}, z_{20}}, K_8^6 \in A_{\Phi_2}^{z_9, z_{10}, z_{17}, z_{18}},$$

$$K_9^6 \in A_{\Phi_1}^{z_{14}, z_{15}, z_{16}, z_{17}}, K_{10}^6 \in A_{\Phi_3}^{z_{13}, z_{14}, z_{11}, z_{12}},$$

$$(x_1 = x_{21}) \Rightarrow (z_1 + (1,1) \in K_1^6 \wedge z_1 + (-1,1) \in K_1^6),$$

$$(x_5 = x_6) \Rightarrow (z_5 + (1,-1) \in K_4^6 \wedge z_5 + (-1,-1) \in K_4^6),$$

$$(z_3 + (0,1) \notin K_3^6 \wedge z_3 + (0,-1) \notin K_2^6) \Rightarrow (z_3 + (-1,1) \in K_3^6 \vee z_3 + (-1,-1) \in K_2^6),$$

$$(x_{15} = x_{16}) \Rightarrow (z_{15} + (1,-1) \in K_9^6 \wedge z_{15} + (-1,-1) \in K_9^6), \quad z_{18} + (0,-1) \in K_6^6\},$$

gdje tačke $z_i = (x_i, y_i) \in Z^2$, $i = 1, 2,..., 28$, imaju svojstva 6.1). *Klasu C_6^1 π-lavirinata* definišimo na sljedeći način

$$C_6^1 = \{c: Z^2 \to E^2 | c^{-1}(\{1\}) = K \in K_{6.1}^{\{z_i\}_{i=\overline{1,28}}}, z_i \in Z^2, \ i = \overline{1,28}, \ \text{zadovoljavaju uslove 6.1)}\}$$

Tačke $z_i = (x_i, y_i) \in Z^2$, $i = 1, 2,...,28$, sa figure na slici 12 imaju svojstva 6.2).
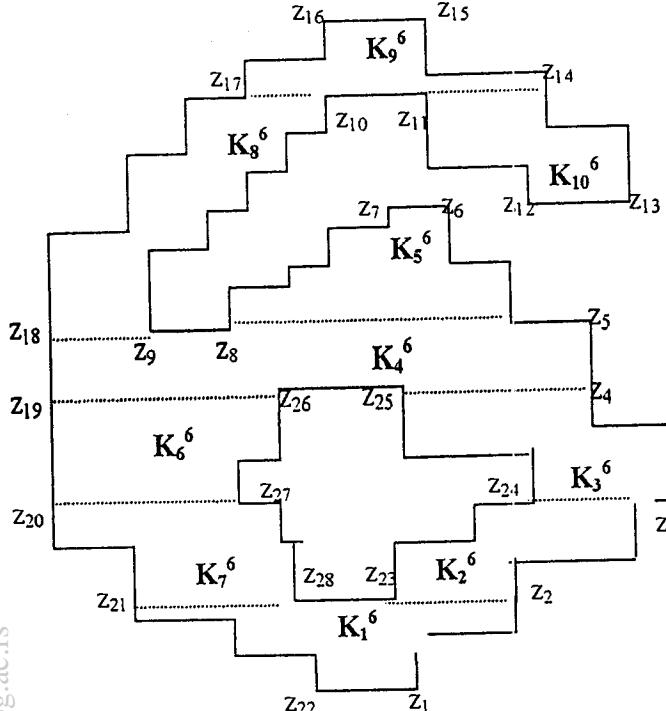
6.2) $\begin{cases} y_{21} = y_{28} = y_{23} = y_2, \\ x_{21} \le x_{28} < x_{23} - 1, \quad x_{23} \le x_2, \\ y_4 > y_3 > y_2, \\ y_{19} = y_{26} = y_{25} = y_4, \\ x_{19} \le x_{26} < x_{25} - 1, \quad x_{25} \le x_4, \\ y_{19} > y_{20}, \quad x_{18} = x_{19} = x_{20}, \\ y_{18} = y_9 = y_8 = y_5, \\ x_{18} \le x_9 < x_8 - 1, \quad x_8 \le x_5, \\ y_{17} = y_{10} = y_{11} = y_{14}, \\ x_{17} \le x_{10} < x_{11} - 1, \quad x_{11} \le x_{14}, \\ y_{17} > y_{18} + 1, \quad y_{13} > y_{14} \end{cases}$

slika 12.

Neka je,

$$K_{6.2}^{\{z_i\}_{i=\overline{1,28}}} = \{K \in P | K = K_1^6 \cup K_2^6 \cup K_3^6 \cup K_4^6 \cup K_5^6 \cup K_6^6 \cup K_7^6 \cup K_8^6 \cup K_9^6 \cup K_{10}^6,$$

$$K_1^6 \in A_{\Phi_4}^{z_1, z_2, z_{21}, z_{22}}, K_2^6 \in A_{\Phi_2}^{z_2, z_3, z_{24}, z_{23}}, K_3^6 \in A_{\Phi_3}^{z_3, z_4, z_{25}, z_{24}}, K_4^6 \in A_{\Phi_6}^{z_4, z_5, z_{18}, z_{19}},$$

$$K_5^6 \in A_{\Phi_1}^{z_5, z_6, z_7, z_8}, K_6^6 \in A_{\Phi_8}^{z_{27}, z_{26}, z_{19}, z_{20}}, K_7^6 \in A_{\Phi_3}^{z_{28}, z_{27}, z_{20}, z_{21}}, K_8^6 \in A_{\Phi_2}^{z_9, z_{10}, z_{17}, z_{18}},$$

$$K_9^6 \in A_{\Phi_1}^{z_{14}, z_{15}, z_{16}, z_{17}}, K_{10}^6 \in A_{\Phi_3}^{z_{13}, z_{14}, z_{11}, z_{12}},$$

$$(x_1 = x_{22}) \Rightarrow (z_1 + (1,1) \in K_1^6 \wedge z_1 + (-1,1) \in K_1^6),$$

$$(x_6 = x_7) \Rightarrow (z_6 + (1,-1) \in K_5^6 \wedge z_6 + (-1,-1) \in K_5^6),$$

$$(z_3 + (0,1) \notin K_3^6 \wedge z_3 + (0,-1) \notin K_2^6) \Rightarrow (z_3 + (-1,1) \in K_3^6 \vee z_3 + (-1,-1) \in K_2^6),$$

$$(x_{15} = x_{16}) \Rightarrow (z_{15} + (1,-1) \in K_9^6 \wedge z_{15} + (-1,-1) \in K_9^6), \quad z_{18} + (0,-1) \in K_4^6\},$$

gdje tačke $z_i = (x_i, y_i) \in Z^2$, $i = 1, 2,..., 28$, imaju svojstva 6.2). *Klasu C_6^2 π-lavirinata* definišimo na sljedeći način

$$C_6^2 = \{c: Z^2 \to E^2 | c^{-1}(\{1\}) = K \in K_{6.2}^{\{z_i\}_{i=\overline{1,28}}}, z_i \in Z^2, i = \overline{1,28}, \text{zadovoljavaju uslove 6.2)}\}.$$

Tačke $z_i = (x_i, y_i) \in Z^2$, $i = 1, 2, ..., 24$, sa figure na slici 13 imaju svojstva 6.3).

$$6.3) \begin{cases} y_{17} = y_{24} = y_{19} = y_2, \\ x_{17} \le x_{24} < x_{19} - 1, \quad x_{19} \le x_{2,} \\ y_4 > y_3 > y_2, \\ y_{15} = y_{22} = y_{21} = y_4, \\ x_{15} \le x_{22} < x_{21} - 1, \quad x_{21} \le x_4, \\ y_{15} > y_{16} > y_{17}, \quad x_{14} = x_{15} = x_{16}, \\ y_{13} > y_{14} + 1, \quad y_{10} > y_{19} \\ y_{13} = y_{16} = y_7 = y_{10}, \\ x_{13} \le x_6 < x_7 - 1, \quad x_7 \le x_{10} \end{cases}$$
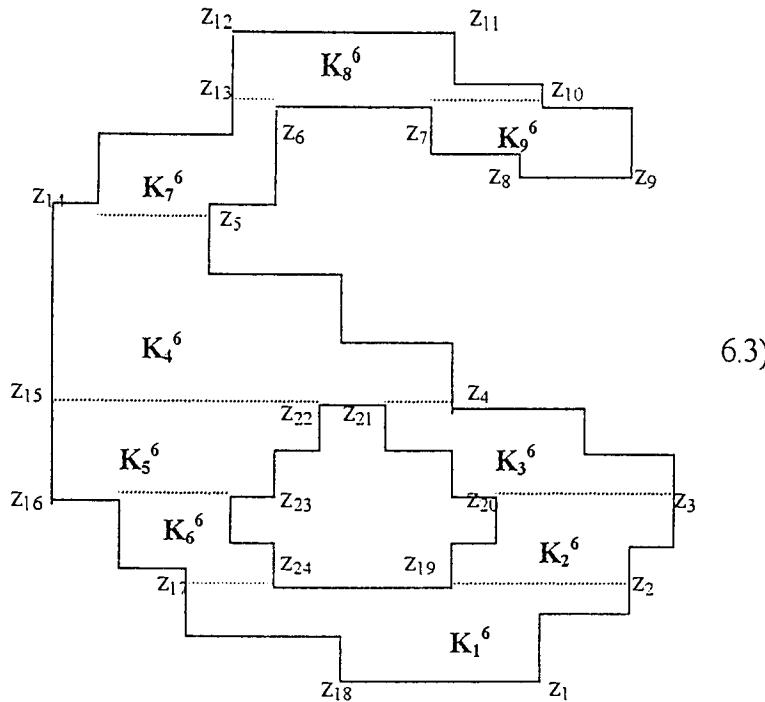
slika 13.

Neka je,

$$K_{6.3}^{\{z_i\}_{i=\overline{1,24}}} = \{K \in P | K = K_1^6 \cup K_2^6 \cup K_3^6 \cup K_4^6 \cup K_5^6 \cup K_6^6 \cup K_7^6 \cup K_8^6 \cup K_9^6,$$

$$K_1^6 \in A_{\Phi_4}^{z_1, z_2, z_{17}, z_{18}}, K_2^6 \in A_{\Phi_2}^{z_2, z_3, z_{20}, z_{19}}, K_3^6 \in A_{\Phi_3}^{z_3, z_4, z_{21}, z_{20}}, K_4^6 \in A_{\Phi_6}^{z_4, z_5, z_{14}, z_{15}},$$

$$K_5^6 \in A_{\Phi_8}^{z_{23}, z_{22}, z_{15}, z_{16}}, K_6^6 \in A_{\Phi_3}^{z_{24}, z_{23}, z_{16}, z_{17}}, K_7^6 \in A_{\Phi_2}^{z_5, z_6, z_{13}, z_{14}}, K_8^6 \in A_{\Phi_1}^{z_{10}, z_{11}, z_{12}, z_{13}},$$

$$K_9^6 \in A_{\Phi_3}^{z_9, z_{10}, z_7, z_8},$$

$$(x_1 = x_{18}) \Rightarrow (z_1 + (1,1) \in K_1^6 \wedge z_1 + (-1,1) \in K_1^6),$$

$$(z_3 + (0,1) \notin K_3^6 \wedge z_3 + (0,-1) \notin K_2^6) \Rightarrow (z_3 + (-1,1) \in K_3^6 \vee z_3 + (-1,-1) \in K_2^6),$$

$$(x_{11} = x_{12}) \Rightarrow (z_{11} + (1,-1) \in K_8^6 \wedge z_{11} + (-1,-1) \in K_8^6)\},$$

gdje tačke $z_i = (x_i, y_i) \in Z^2$, $i = 1, 2, ..., 24$, imaju svojstva 6.3). *Klasu C_6^3 π-lavirinata* definišimo na sljedeći način

$$C_6^3 = \{c: Z^2 \to E^2 | c^{-1}(\{1\}) = K \in K_{6.3}^{\{z_i\}_{i=\overline{1,24}}}, z_i \in Z^2, \quad i = \overline{1,24}, \text{ zadovoljavaju uslove 6.3}\}.$$

Klasa C_6 π-lavirinata je
$C_6 = C_6^1 \cup C_6^2 \cup C_6^3.$

§ 2.8. *Klasa C_7 π-lavirinata*

Da bi definisali elemente klase C_7 π-lavirinata, poslužimo se figurom sa slike 14. Tačke $z_i = (x_i, y_i) \in Z^2$, $i = 1, 2, ..., 9$, sa ove figure imaju svojstva 7).
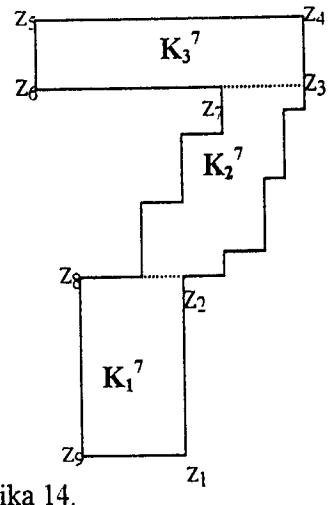
$$7) \quad \begin{cases} y_3 > y_2 > y_1, \\ x_6 < x_7 - 1 \end{cases}$$

slika 14.

Neka je,

$$K_7^{\{z_i\}_{i=\overline{1,9}}} = \{K \in P \mid K = K_1^1 \cup K_2^1 \cup K_3^1, K_1^1 \in A_{\Phi_9}^{z_1,z_2,z_8,z_9}, K_2^1 \in A_{\Phi_2}^{z_2,z_3,z_7,z_8},$$

$$K_3^1 \in A_{\Phi_9}^{z_3,z_4,z_5,z_6}, z_8 + (0,1) \notin K_2^7, z_3 + (0,-1) \in K_2^7\}$$

gdje tačke $z_i = (x_i, y_i) \in Z^2$, $i = 1, 2, ..., 9$, imaju svojstva 7). *Klasa C_7 π-lavirinata* je

$$C_7 = \{c: Z^2 \to E^2 \mid c^{-1}(\{1\}) = K \in K_7^{\{z_i\}_{i=\overline{1,9}}}, z_i \in Z^2, \ i = \overline{1,9}, \text{zadovoljavaju uslove 7)}\}.$$

§ 2.9. *Klasa C_8 π-lavirinata*

Da bi definisali elemente klase C_8 π-lavirinata, poslužimo se figurom sa slike 15. Tačke $z_i = (x_i, y_i) \in Z^2$, $i = 1, 2, ..., 30$, sa ove figure imaju svojstva 8).

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$$\begin{cases} y_{17} = y_{24} = y_{19} = y_2, \\ x_{17} \le x_{24} < x_{19} - 1, \quad x_{19} \le x_2, \\ y_4 > y_3 > y_2, y_{15} > y_{16} > y_{17}, \\ y_{15} = y_{22} = y_{21} = y_4, \\ x_{15} \le x_{22} < x_{21} - 1, \quad x_{21} \le x_4, \\ y_{13} = y_{30} = y_{25} = y_6, \\ x_{13} \le x_{30} < x_{25} - 1, \quad x_{25} \le x_6, \\ y_8 > y_7 > y_6, \quad y_{11} > y_{12} > y_{13}, \\ y_{11} = y_{28} = y_{27} = y_8, \\ x_{11} \le x_{28} < x_{27} - 1, \quad x_{27} \le x_8 \end{cases}$$

8)
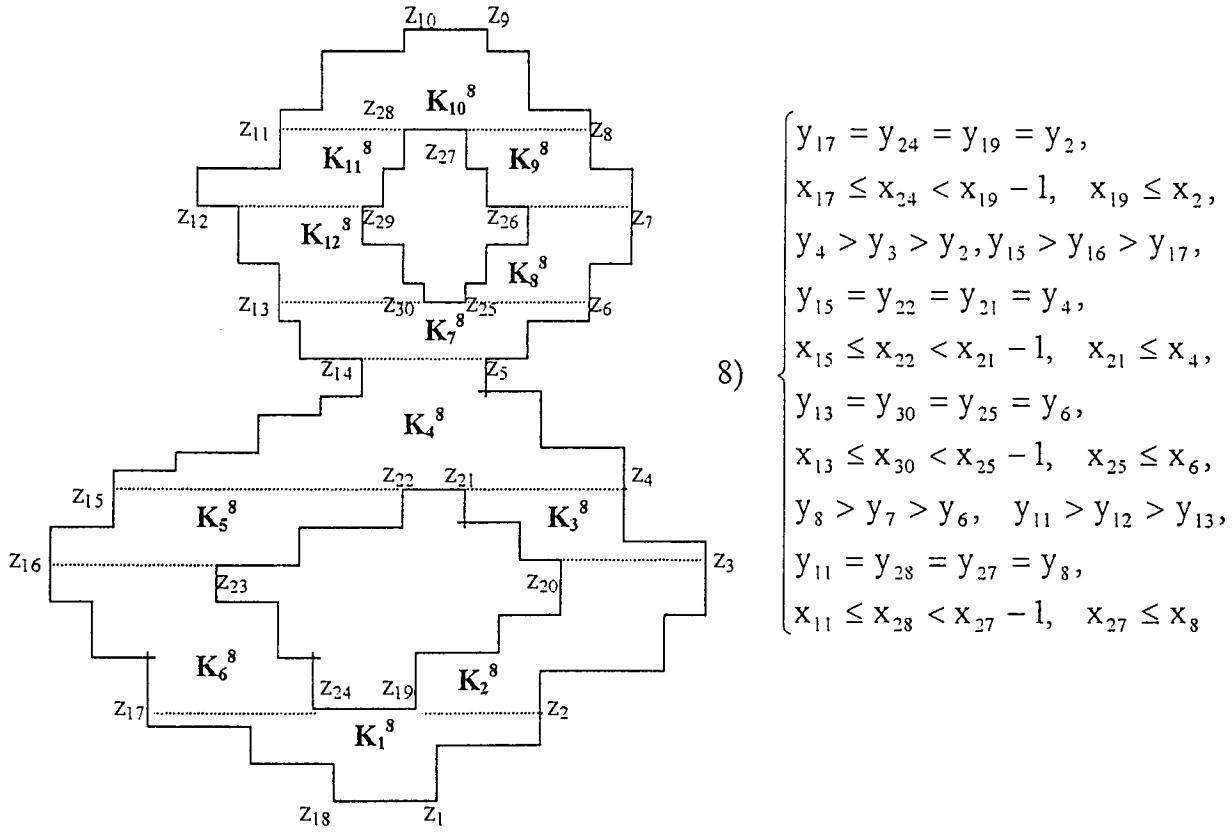
slika 15.

Neka je,

$$K_8^{\{z_i\}_{i=\overline{1,30}}} = \{K \in P \mid K = K_1^8 \cup K_2^8 \cup K_3^8 \cup K_4^8 \cup K_5^8 \cup K_6^8 \cup K_7^8 \cup K_8^8 \cup K_9^8 \cup K_{10}^8 \cup K_{11}^8 \cup K_{12}^8,$$

$$K_1^8 \in A_{\Phi_4}^{z_1, z_2, z_{17}, z_{18}}, K_2^8 \in A_{\Phi_2}^{z_2, z_3, z_{20}, z_{19}}, K_3^8 \in A_{\Phi_3}^{z_3, z_4, z_{21}, z_{20}}, K_4^8 \in A_{\Phi_1}^{z_4, z_5, z_{14}, z_{15}},$$

$$K_5^8 \in A_{\Phi_2}^{z_{23}, z_{22}, z_{15}, z_{16}}, K_6^8 \in A_{\Phi_3}^{z_{24}, z_{23}, z_{16}, z_{17}}, K_7^8 \in A_{\Phi_4}^{z_5, z_6, z_{13}, z_{14}}, K_8^8 \in A_{\Phi_2}^{z_6, z_7, z_{26}, z_{27}},$$

$$K_9^8 \in A_{\Phi_3}^{z_7, z_8, z_{27}, z_{26}}, K_{10}^8 \in A_{\Phi_1}^{z_8, z_9, z_{10}, z_{11}}, K_{11}^8 \in A_{\Phi_2}^{z_{29}, z_{28}, z_{11}, z_{12}}, K_{12}^8 \in A_{\Phi_3}^{z_{30}, z_{29}, z_{12}, z_{13}},$$

$$(x_1 = x_{18}) \Rightarrow (z_1 + (1,1) \in K_1^8 \wedge z_1 + (-1,1) \in K_1^8),$$

$$(z_3 + (0,1) \notin K_3^8 \wedge z_3 + (0,-1) \notin K_2^8) \Rightarrow (z_3 + (-1,1) \in K_3^8 \vee z_3 + (-1,-1) \in K_2^8),$$

$$(x_5 = x_{14}) \Rightarrow (z_5 + (1,-1) \in K_4^8 \wedge z_5 + (-1,-1) \in K_4^8),$$

$$(z_{16} + (0,1) \notin K_5^8 \wedge z_{16} + (0,-1) \notin K_6^8) \Rightarrow (z_{16} + (1,1) \in K_5^8 \vee z_{16} + (1,-1) \in K_6^8),$$

$$(z_7 + (0,1) \notin K_9^8 \wedge z_7 + (0,-1) \notin K_8^8) \Rightarrow (z_7 + (-1,1) \in K_9^8 \vee z_7 + (-1,-1) \in K_8^8),$$

$$(x_9 = x_{10}) \Rightarrow (z_9 + (1,-1) \in K_{10}^8 \wedge z_9 + (-1,-1) \in K_{10}^8),$$

$$(z_{12} + (0,1) \notin K_{11}^8 \wedge z_{12} + (0,-1) \notin K_{12}^8) \Rightarrow (z_{12} + (1,1) \in K_{11}^8 \vee z_6 + (1,-1) \in K_{12}^8)\}$$

gdje tačke $z_i = (x_i, y_i) \in Z^2$, $i = 1, 2, ..., 30$, imaju svojstva 8). *Klasa C_8 π-lavirinata* je

$$C_8 = \{c: Z^2 \to E^2 \mid c^{-1}(\{1\}) = K \in K_8^{\{z_i\}_{i=\overline{1,30}}}, z_i \in Z^2, \ i = \overline{1,30}, \text{ zadovoljavaju uslove 8)} \}.$$

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§ 2.10. *Klasa C_9 π-lavirinata*

Da bi definisali elemente klase C_9 π-lavirinata, poslužimo se figurama sa slika 16, 17, 18.

Tačke $z_i = (x_i, y_i) \in Z^2$, $i = 1, 2, ..., 28$, sa figure na slici 16 imaju svojstva 9.1).
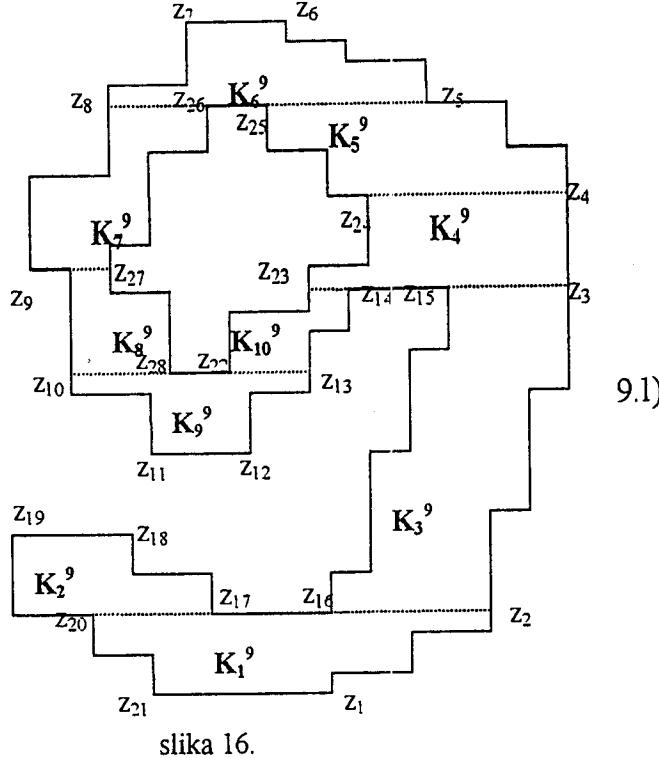
$$9.1) \begin{cases} y_{20} = y_{17} = y_{16} = y_2, \\ x_{20} \leq x_{17} < x_{16} - 1, \quad x_{16} \leq x_2, \\ y_{19} > y_{20}, \quad y_3 > y_2 + 1, \\ y_5 > y_4 > y_3, \\ y_8 = y_{26} = y_{25} = y_5, \\ x_8 \leq x_{26} < x_{25} - 1, \quad x_{25} \leq x_5, \\ y_8 > y_9 > y_{10}, \\ y_{10} = y_{28} = y_{22} = y_{13}, \\ x_{10} \leq x_{28} < x_{22} - 1, \quad x_{22} \leq x_{13}, \\ y_{23} = y_{14} = y_{15} = y_3, \\ x_{23} \leq x_{14} < x_{15} - 1, \quad x_{15} \leq x_3, \\ y_{14} > y_{13}, \quad x_3 = x_4 \end{cases}$$

slika 16.

Neka je,

$$K_{9.1}^{\{z_i\}_{i=\overline{1,28}}} = \{K \in \mathbf{P} \mid K = K_1^9 \cup K_2^9 \cup K_3^9 \cup K_4^9 \cup K_5^9 \cup K_6^9 \cup K_7^9 \cup K_8^9 \cup K_9^9 \cup K_{10}^9,$$

$$K_1^9 \in A_{\Phi_4}^{z_1, z_2, z_{20}, z_{21}}, K_2^9 \in A_{\Phi_3}^{z_{17}, z_{18}, z_{19}, z_{20}}, K_3^9 \in A_{\Phi_2}^{z_2, z_3, z_{15}, z_{16}}, K_4^9 \in A_{\Phi_5}^{z_3, z_4, z_{24}, z_{23}},$$

$$K_5^9 \in A_{\Phi_3}^{z_4, z_5, z_{25}, z_{24}}, K_6^9 \in A_{\Phi_1}^{z_5, z_6, z_7, z_8}, K_7^9 \in A_{\Phi_2}^{z_{27}, z_{26}, z_8, z_9}, K_8^9 \in A_{\Phi_3}^{z_{28}, z_{27}, z_9, z_{10}},$$

$$K_9^9 \in A_{\Phi_2}^{z_{13}, z_{14}, z_{23}, z_{22}}, K_{10}^9 \in A_{\Phi_4}^{z_{12}, z_{13}, z_{10}, z_{11}},$$

$$(x_1 = x_{21}) \Rightarrow (z_1 + (1,1) \in K_1^9 \wedge z_1 + (-1,1) \in K_1^9),$$

$$(x_6 = x_7) \Rightarrow (z_6 + (1,-1) \in K_6^9 \wedge z_6 + (-1,-1) \in K_6^9),$$

$$(z_9 + (0,1) \notin K_7^9 \wedge z_9 + (0,-1) \notin K_8^9) \Rightarrow (z_9 + (1,-1) \in K_8^9 \vee z_9 + (1,1) \in K_7^9),$$

$$(x_{11} = x_{12}) \Rightarrow (z_{11} + (1,1) \in K_{10}^9 \wedge z_{15} + (-1,1) \in K_{10}^9), z_3 + (0,1) \in K_4^9\}$$

gdje tačke $z_i = (x_i, y_i) \in Z^2$, $i = 1, 2, ..., 28$, imaju svojstva 9.1). *Klasu C_9^l π-lavirinata* definišimo na sljedeći način

$$C_9^l = \{c: Z^2 \to E^2 \mid c^{-1}(\{1\}) = K \in K_{9.1}^{\{z_i\}_{i=\overline{1,28}}}, z_i \in Z^2, i = \overline{1,28}, \text{zadovoljavaju uslove 9.1)}\}.$$

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Tačke $z_i = (x_i, y_i) \in Z^2$, $i = 1, 2, ..., 28$, sa figure na slici 17 imaju svojstva 9.2).

$$9.2)\ \begin{cases} y_{21} = y_{18} = y_{17} = y_2, \\ x_{21} \le x_{18} < x_{17} - 1, \quad x_{17} \le x_2, \\ y_{20} > y_{21}, \quad y_3 > y_2 + 1, \\ y_{12} = y_{15} = y_{16} = y_3, \\ x_{12} \le x_{15} < x_{16} - 1, \quad x_{16} \le x_3, \\ y_{11} = y_{28} = y_{23} = y_4, \\ x_{11} \le x_{28} < x_{23} - 1, \quad x_{23} \le x_4, \\ y_6 > y_5 > y_4, \\ y_9 = y_{26} = y_{25} = y_6, \\ x_9 \le x_{26} < x_{25} - 1, \quad x_{25} \le x_6, \\ y_9 > y_{10} > y_{11}, \quad x_3 = x_4 = x_5 \end{cases}$$

slika 17.
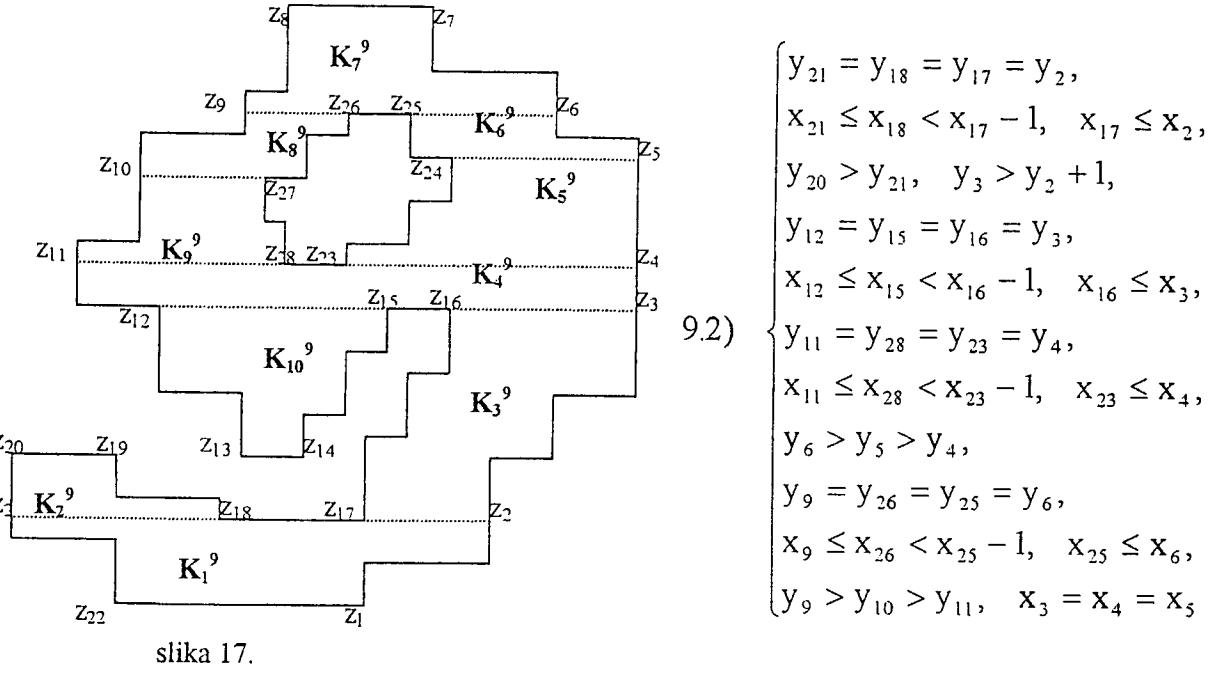
Neka je,

$$K_{9.2}^{\{z_i\}_{i=\overline{1,28}}} = \{K \in \mathbf{P} \mid K = K_1^9 \cup K_2^9 \cup K_3^9 \cup K_4^9 \cup K_5^9 \cup K_6^9 \cup K_7^9 \cup K_8^9 \cup K_9^9 \cup K_{10}^9,$$

$$K_1^9 \in A_{\Phi_4}^{z_1, z_2, z_{21}, z_{22}}, K_2^9 \in A_{\Phi_3}^{z_7, z_8, z_{20}, z_{21}}, K_3^9 \in A_{\Phi_2}^{z_2, z_3, z_{16}, z_{17}}, K_4^9 \in A_{\Phi_7}^{z_3, z_4, z_{11}, z_{12}},$$

$$K_5^9 \in A_{\Phi_5}^{z_4, z_5, z_{24}, z_{23}}, K_6^9 \in A_{\Phi_3}^{z_5, z_6, z_{25}, z_{24}}, K_7^9 \in A_{\Phi_1}^{z_6, z_7, z_8, z_9}, K_8^9 \in A_{\Phi_2}^{z_{27}, z_{26}, z_9, z_{10}},$$

$$K_9^9 \in A_{\Phi_3}^{z_{28}, z_{27}, z_{10}, z_{11}}, K_{10}^9 \in A_{\Phi_4}^{z_{14}, z_{15}, z_{12}, z_{13}},$$

$$(x_1 = x_{22}) \Rightarrow (z_1 + (1,1) \in K_1^9 \wedge z_1 + (-1,1) \in K_1^9),$$

$$(x_7 = x_8) \Rightarrow (z_7 + (1,-1) \in K_7^9 \wedge z_7 + (-1,-1) \in K_7^9),$$

$$(z_{10} + (0,1) \notin K_8^9 \wedge z_{10} + (0,-1) \notin K_9^9) \Rightarrow (z_{10} + (-1,1) \in K_8^9 \vee z_{10} + (-1,-1) \in K_9^9),$$

$$(x_{13} = x_{14}) \Rightarrow (z_{13} + (1,1) \in K_{10}^9 \wedge z_{13} + (-1,1) \in K_{10}^9), z_3 + (0,1) \in K_4^9\}$$

gdje tačke $z_i = (x_i, y_i) \in Z^2$, $i = 1, 2, ..., 28$, imaju svojstva 9.2). *Klasu C_9^2 π-lavirinata* definišimo na sljedeći način

$$C_9^2 = \{c: Z^2 \to E^2 \mid c^{-1}(\{1\}) = K \in K_{9.2}^{\{z_i\}_{i=\overline{1,28}}}, z_i \in Z^2, i = \overline{1,28}, \text{zadovoljavaju uslove 9.2)}\}.$$

Tačke $z_i = (x_i, y_i) \in Z^2$, $i = 1, 2, ..., 24$, sa figure na slici 18 imaju svojstva 9.3).
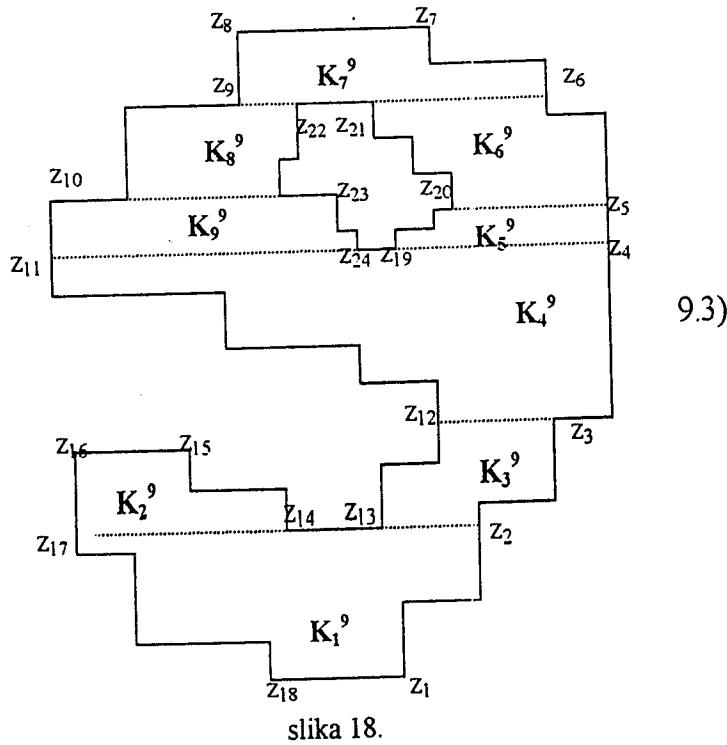
$$9.3) \quad \begin{cases} y_{17} = y_{14} = y_{13} = y_2, \\ x_{17} \leq x_{14} < x_{13} - 1, \quad x_{13} \leq x_2, \\ y_{16} > y_{17}, \quad y_3 > y_2 + 1, \\ x_5 = x_4 = x_3, \\ y_{11} = y_{24} = y_{19} = y_4, \\ x_{11} \leq x_{24} < x_{19} - 1, \quad x_{19} \leq x_4, \\ y_6 > y_5 > y_4, \quad y_9 > y_{10} > y_{11}, \\ y_9 = y_{22} = y_{21} = y_6, \\ x_9 \leq x_{22} < x_{21} - 1, \quad x_{21} \leq x_6, \end{cases}$$

slika 18.

Neka je,

$$K_{9.3}^{\{z_i\}_{i=\overline{1,28}}} = \{K \in \mathbf{P} \mid K = K_1^9 \cup K_2^9 \cup K_3^9 \cup K_4^9 \cup K_5^9 \cup K_6^9 \cup K_7^9 \cup K_8^9 \cup K_9^9,$$

$$K_1^9 \in A_{\Phi_4}^{z_1, z_2, z_{18}, z_{19}}, K_2^9 \in A_{\Phi_3}^{z_{14}, z_{15}, z_{16}, z_{17}}, K_3^9 \in A_{\Phi_2}^{z_2, z_3, z_{12}, z_{13}}, K_4^9 \in A_{\Phi_7}^{z_3, z_4, z_{11}, z_{12}},$$

$$K_5^9 \in A_{\Phi_5}^{z_4, z_5, z_{20}, z_{19}}, K_6^9 \in A_{\Phi_3}^{z_5, z_6, z_{21}, z_{20}}, K_7^9 \in A_{\Phi_1}^{z_6, z_7, z_8, z_9}, K_8^9 \in A_{\Phi_2}^{z_{23}, z_{22}, z_9, z_{10}},$$

$$K_9^9 \in A_{\Phi_3}^{z_{24}, z_{23}, z_{10}, z_{11}},$$

$$(x_1 = x_{18}) \Rightarrow \left(z_1 + (1,1) \in K_1^9 \land z_1 + (-1,1) \in K_1^9\right),$$

$$(x_7 = x_8) \Rightarrow \left(z_7 + (1,-1) \in K_7^9 \land z_7 + (-1,-1) \in K_7^9\right),$$

$$\left(z_{10} + (0,1) \notin K_8^9 \land z_{10} + (0,-1) \notin K_9^9\right) \Rightarrow \left(z_{10} + (-1,1) \in K_8^9 \lor z_{10} + (-1,-1) \in K_9^9\right)\}$$

gdje tačke $z_i = (x_i, y_i) \in Z^2$, $i = 1, 2, ..., 24$, imaju svojstva 9.3). *Klasu C_9^3 π-lavirinata* definišimo na sljedeći način

$$C_9^3 = \{c: Z^2 \to E^2 \mid c^{-1}(\{1\}) = K \in \mathbb{K}_{9.3}^{\{z_1\}_{i=\overline{1,28}}}, \quad z_i \in Z^2, \quad i = \overline{1,24}, \quad \text{zadovoljavaju uslove 6.3)}\}.$$

Klasa C_9 π-lavirinata je
$C_9 = C_9^1 \cup C_9^2 \cup C_9^3$.

3. Prepoznavanje klasa π-lavirinata automatima

U prethodnoj glavi smo definisali deset klasa π-lavirinata. Ovdje ćemo izložiti rezultate ispitivanja njihove prepoznatljivosti automatima, odnosno kolektivima automata. Navedena su i dva tvrđenja. Jedno od njih ukazuje na ograničene mogućnosti automata u prepoznavanju, preciznije, pokazuje se da postoji pravougaoni lavirint L takav da za proizvoljno $v \in V(L)$, ne postoji automat koji prepoznaje inicijalni lavirint L_v. S druge strane, pokazuje se da za proizvoljan mozaični lavirint L, postoji automat koji za svako $v \in V(L)$ prepoznaje lavirint L_v.

U daljem tekstu ćemo raditi isključivo sa 2-dimenzionalnim lavirintima, tako da ćemo umjesto "2-dimenzionalni lavirint" pisati samo "lavirint".

Ako je L pravougaoni lavirint, označimo sa $diam(L) = \max\{d(u, v)| u, v \in V(L)\}$, gdje je $d(u, v) = ((\Pi p_1(u) - \Pi p_1(v))^2 + (\Pi p_2(u) - \Pi p_2(v))^2)^{\frac{1}{2}}$.

Neka je (L, v_0) lavirint. Ukoliko za neko uzajamno jednoznačno preslikavanje μ skupa V(L) u skup R^2, postoji pravougaoni lavirint $(L_1, \mu(v_0))$ takav da su lavirinti L i L_1 izomorfni, gdje μ definiše taj izomorfizam, kažemo da je lavirint L *smjestiv ili postoji njegovo slaganje u ravni*. Ukoliko je lavirint L smjestiv, preslikavanje μ nazivamo smještač. Jasno, ako pri fiksiranom μ postoji L_1, to je on jedinstven. Prema tome, pod smještanjem lavirinta L nekada ćemo podrazumjevati L_1, a nekada realizaciju $\overline{L_1}$. Jasno, ako je lavirint L drvo (graf koji se dobija iz simetričnog digrafa (V(L), E(L)), ukoliko se parovi orijentisanih grana suprotne orijentacije zamjene neorijentisanim granama je drvo), tada je lavirint L smjestiv.

Neka je L lavirint takav da $V(L) = V_x \cup V_y$, $V_x \cap V_y = \emptyset$, $|V_x| = |V_y| = k$, $k \geq 2$. Pretpostavimo da $V_x = \{x_1, x_2,...,x_k\}$ i $V_y = \{y_1, y_2,...,y_k\}$. Za lavirint L kažemo da je w-stepenica, $w \in \{e, n\}$ ako postoji takav smještač μ, tako da:

a) $\Pi p_m (\mu(x_i)) = \Pi p_m (\mu(x_j))$, $\Pi p_m (\mu(y_i)) = \Pi p_m (\mu(y_j))$ i $\Pi p_n (\mu(x_s)) = \Pi p_n (\mu(y_s))$, $i \neq j$, i, j, s $\in \{1,..,k\}$,

b) Ako je $\Pi p_n (\mu(x_{i_1})) < \Pi p_n (\mu(x_{i_2})) < ...< \Pi p_n (\mu(x_{i_k}))$, $i_j \in \{1,2,..,k\}$, tada je

$E(L) = \{<x_{i_{j-1}}, x_{i_j}>, <x_{i_j}, x_{i_{j+1}}> \mid j \in \{2,...,k-1\}\} \cup \{<y_{i_{j-1}}, y_{i_j}>, <y_{i_j}, y_{i_{j+1}}> \mid j \in \{2,...,k-1\}\} \cup \{<x_i, y_i> \mid i \in \{1,...,k\}\}$,

gdje (m, n) = (1, 2) ako je $w = n$ i (m, n) = (2, 1) ako je $w = e$ (lavirint L ćemo zvati stepenica ukoliko je on e-stepenica ili n-stepenica).

Neka su L_1 i L_2 dva lavirinta takva da $V(L_1) \cap V(L_2) = \emptyset$, $x_1 \in V(L_1)$, $x_2 \in V(L_2)$ i $[x_1]_{L_1} \cap [x_2]_{L_2} = \emptyset$. Neka je $V_2' = V(L_2) \setminus \{x_2\}$. Neka je lavirint $L(x_1)$ takav da $V(L(x_1)) = \{x_1\} \cup \{x_1\} \times V_2'$ i preslikavanje $i : V(L_2) \rightarrow V(L(x_1))$ definisano sa $i(x_2) = x_1$ i $i(x) = (x_1, x)$, $x \in V_2'$, je izomorfizam lavirinata L_2 i $L(x_1)$. Tada sa $L_1 \underset{x_1, x_2}{+} L_2$ označimo lavirint takav da je $V(L_1 \underset{x_1, x_2}{+} L_2) = V(L_1) \cup V(L(x_1))$ i $E(L_1 \underset{x_1, x_2}{+} L_2) = E(L_1) \cup E(L(x_1))$, pri čemu, ako je $u \in E(L_1)$, tada je $|u| = |u|_{L_1}$, a ako je $u \in E(L(x_1))$, tada je $|u| = |u|_{L_2}$. Ukoliko je u lavirintu L_1 izdvojen ulaz v_0, tada je to ulaz i za lavirint $L_1 \underset{x_1, x_2}{+} L_2$. Kažemo

da je lavirint $L_1 \underset{x_1,x_2}{+} L_2$ dobijen spajanjem čvorova x_1 i x_2 lavirinata L_1 i L_2. U [18] je dokazano da ako su L_1, L_2 smjestivi lavirinti, takvi da je L_2 drvo, tada je i lavirint $L_1 \underset{x_1,x_2}{+} L_2$ smjestiv.

Neka je **Step** $=\{L \mid L$ je stepenica ili postoje $x_1,...,x_s \in V(L)$, drveta lavirinti L_1, $...,L_s$ i lavirint stepenica L' tako da $\quad L = L' \underset{x_1,x^1}{+} L_1 \underset{x_2,x^2}{+} ... \underset{x_s,x^s}{+} L_s$, gdje $x_1,...,x_s \in V(L')$, $x^i \in V(L_i)$, $i \in \{1,2,...,s\}\}$.

Za lavirint L kažemo da je ε-smjestiv ako postoji smještač μ lavirinta L, takav da $diam(\mu(V(L))) < \varepsilon$. Jasno, ako je lavirint L drvo ili stepenica, tada je L ε-smjestiv za sve $\varepsilon > 0$.

§ 3.1. Dvije teoreme o prepoznavanju lavirinata automatima

Teorema 1. Ako je lavirint $L \in$ **Step** tada za sve $v \in V(L)$ ne postoji automat koji prepoznaje lavirint L_v.

Dokaz: Pretpostavimo da je L n-stepenica i $\|V\| = 2k$. Neka automat $Aq_0 = (A, Q, B, \varphi, \psi, q_0)$ prepoznaje lavirint $(L; v_0)$, za neko $v_0 \in V(L)$. Ako je $v \in V(L)$, označimo sa $nm(v)$ broj pojavljivanja čvora v u nizu $\pi\left(A_{q_0}; L_{v_0}; t\right)$, gdje je $t \geq 0$, takvo da $\psi(q_t, [v_t])$ $=1$ i $\varphi(q_t, [v_t]) = q_t$. Neka je $n = \max \{ nm(v) \mid v \in V(L)\}$. Neka su $u, v \in V(L)$ takvi da $[u] = \{e, s\}$ i $[v] = \{w, s\}$ ($<u, v> \in E(L)$). Neka je L', gdje je $V(L') = V(L) \cup \{x, y\}$, $E(L') = <u, x> \cup <v, y> \cup E(L) \setminus <u, v>$, $|(u, x)| = e$, $|(v, y)| = w$. Neka je $L^x = L' \setminus \{y\}$, $L^y = L' \setminus \{x\}$.
Neka je

$$L_1 = \left(\left(\left(L' \underset{x, z^1}{+} L^{y^1_k}\right) \underset{y^1_k, z^2}{+} L^{y^2_k}\right) \underset{y^2_k, z^3}{+} \cdots \underset{y^n_k, z^{n+1}}{+} L^{y^{n+1}_k}\right),$$

gdje je $L^{y^i_k}$ lavirint izomorfan lavirintu L^x dobijen preoznačavanjem čvorova f_i : $V(L^x) \to V(L^{y^i_k})$ i pri tome $f_i(x) = y^i_k$ i $f_i(v) = z^i$, $1 \leq i \leq n + 1$.
Neka je

$$\widetilde{L} = \left(\left(\left(L_1 \underset{y, w^1}{+} L^{x^1_k}\right) \underset{x^1_k, w^2}{+} L^{x^2_k}\right) \underset{x^2_k, w^3}{+} \cdots \underset{x^n_k, w^{n+1}}{+} L^{x^{n+1}_k}\right),$$

gdje je $L^{x^i_k}$ lavirint izomorfan lavirintu L^y dobijen preoznačavanjem čvorova g_i : $V(L^y) \to V(L^{x^i_k})$ i pri tome $g_i(y) = x^i_k$ i $g_i(u) = w^i$, $1 \leq i \leq n + 1$.

Treba dokazati da je lavirint $\widetilde{L}$ smjestiv.

Neka je μ smještač lavirinta L takav da $\mu(V(L)) = \{x_1,...,x_k, y_1,..., y_k\}$, $\Pi p_1(x_i) = \Pi p_1(x_j)$, $\Pi p_1(y_i) = \Pi p_1(y_j)$, $\Pi p_2(x_s) = \Pi p_2(y_s)$, $i \neq j$, $i, j, s \in \{1,..,k\}$ i $\Pi p_2(x_1) < \Pi p_2(x_2) < ... < \Pi p_2(x_k)$. Pretpostavimo i da je $\Pi p_1(y_1) > \Pi p_1(x_1)$ (slika 19. a)).

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Neka su x, $y \in \mathbf{R}^2$ takvi da $\Pi p_2(y_k) = \Pi p_2(y) = \Pi p_2(x)$ $(=\Pi p_2(x_k))$ i $\Pi p_1(x_k) < \Pi p_1(x) < \Pi p_1(y) < \Pi p_1(y_k)$. Udaljimo duž $\overline{xy}$. Na ovaj način smo definisali smještanje lavirinta L' (slika 19. b)).

Neka je μ' smještač lavirinta L, takav da $\mu'(V(L)) = \{ x_1^1,...,x_k^1, y_1^1,...,y_k^1 \}$, $\Pi p_1(x_i^1) = \Pi p_1(x_j^1)$, $\Pi p_1(y_i^1) = \Pi p_1(y_i^1)$, $\Pi p_2(x_s^1) = \Pi p_2(y_s^1)$, $i \neq j$, i, j, $s \in \{1,..,k\}$ i $\Pi p_2(x_1^1) < \Pi p_2(x_2^1) < ... < \Pi p_2(x_k^1)$. Pretpostavimo da je $\Pi p_1(y_1^1) > \Pi p_1(x_1^1)$. Neka je $x \in \mathbf{R}^2$ takvo da $\Pi p_2(y_k^1) = \Pi p_2(x)$ $(=\Pi p_2(x_k^1))$ i $\Pi p_1(x_k^1) < \Pi p_1(x) < \Pi p_1(y_k^1)$. Udaljimo duž $\overline{xy_k^1}$. Neka je $z^1 \in \mathbf{R}^2$, takvo da $\Pi p_2(z^1) > \Pi p_2(y_k^1)$, $\Pi p_1(z^1) = \Pi p_1(y_k^1)$. Udaljimo duž $\overline{y_{k-1}^1 y_k^1}$ a dodajmo duž $\overline{y_{k-1}^1 z^1}$. Na ovaj način smo definisali smještač μ^1 lavirinta $L^{y_k^1}$ (slika 19. c)). i neka je on takav da je diam($\mu^1(V(L^{y_k^1})))< \min\{d(u, v)| u, v \in \mu(V(L))\}$.

Translacijom τ_α, gdje je $\alpha = \overline{z^1, x}$, pravouglog lavirinta $L^{y_k^1}$ dobijamo smještanje lavirinta $L' \underset{x, z^1}{+} L^{y_k^1}$.

Lavirint $L^{y_k^i}$, $i \in \{2,...,n + 1\}$, možemo smjestiti u ravan kao na slici 19. c), tako da je diam($V(\overline{ L^{y_k^i} }))< $ diam$\left(V\left(\left(\left(\left(L' \underset{x, z^1}{+} L^{y_k^1} \right)\underset{y_k^1, z^2}{+} L^{y_k^2} \right)\underset{y_k^2, z^3}{+}\cdots \underset{y_k^{i-2}, z^{i-1}}{+} L^{y_k^{i-1}} \right)\right)\right)$,($y_k^0 = x$).

Na ovaj način smo dobili smještanje lavirinta L_1 (slika 19. d)).

Slično, lavirinte $L^{x_k^i}$, izomorfne lavirintu L^y, možemo smjestiti u ravan kao što je to prikazano na slici 19. e), s tim što je diam($V(\overline{ L^{x_k^i} })) \leq$ diam($V(\overline{ L^{y_k^i} })$).
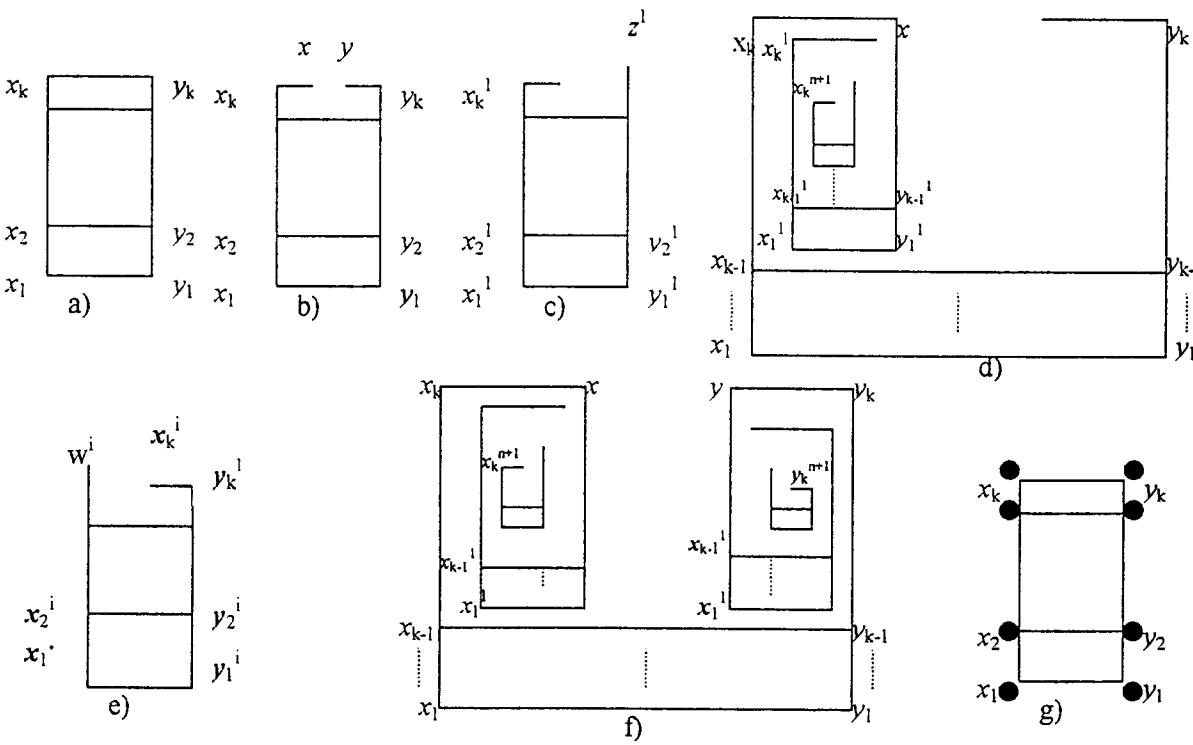
slika 19.

Smještanje lavirinta $\tilde{L}$ je dato na slici 19. f).

Za automat Aq_0 važi $Tr\left(Aq_0;(L;v_0)\right) = Tr\left(Aq_0;(\tilde{L};v_0)\right)$.

Primjetimo, ukoliko je lavirint L e-stepenica i $\overline{L}$ jedna njegova realizacija u ravni, tada rotacijom figure $\overline{L}$ za ugao $\pi/2$ oko bilo kog tjemena $x \in V(\overline{L})$ dobijamo figuru $\overline{L}'$ koja je smještanje lavirinta koji je n-stepenica.

Ukoliko je $L = L' \underset{x_1,x^2}{+} L_1 \underset{x_2,x_2}{+} \ldots \underset{x_s,x'}{+} L_s$, dokaz je sličan s tom razlikom što prilikom

smještanja lavirinta $\tilde{L}$ drvo L_i i njemu izomorfna drveta treba smjestiti tako da je njihov dijametar dovoljno mali, $1 \leq i \leq s$. Slaganje lavirinta L u ravni može biti predstavljeno kao na slici 19. g) (lavirinti drveta L_i, $1 \leq i \leq s$, su ε-smjestivi, za sve $\varepsilon > 0$, što je predstavljeno sa ●).

$\square$

Teorema 2. Ako je L mozaični lavirint tada postoji automat $Aq_0 = (A, Q, B, \varphi, \psi, q_0, Q_F)$, $Q_F = \{ q_{F_0}, q_{F_1} \} \subseteq Q$, koji prepoznaje klasu $\{L_v \mid v \in V(L)\}$.

Dokaz: Neka je $V(L) = \{v_1, v_2, \ldots, v_n\}$. Ako je $p = y_0(y_0 y_1)y_1(y_1 y_2)\ldots y_{m-1}(y_{m-1} y_m)y_m$ put u digrafu $(V(L), E(L))$, sa $d(p)$ označimo dužinu puta p, a sa $[p]_i$ ozanačimo i-tu granu tog puta. Neka su $p_1 = v_1(v_1 v_{i_1}^1) v_{i_1}^1 \ldots v_{i_{s_1}-1}^1 (v_{i_{s_1}-1}^1, v_{i_{s_1}}^1) v_{i_{s_1}}^1 ,\ldots,$ $p_n =$

$v_n(v_n v_{i_1}^n) v_{i_1}^n \ldots v_{i_{s_n}-1}^n (v_{i_{s_n}-1}^n, v_{i_{s_n}}^n) v_{i_{s_n}}^n$ putevi u digrafu $(V(L),E(L))$, takvi da $\{v_p\} \bigcup\limits_{j=1}^{s_p} v_{i_j}^p =$

$V(L)$, $p \in \{1,\ldots,n\}$. Neka su $x_i \subseteq D$, $i \in \{1,\ldots,l\}$, takvi da $x_i \neq x_j$ za $i \neq j$, $i, j \in \{1,\ldots,l\}$ i za sve $i \in \{1,\ldots,n\}$ postoji $j \in \{1,\ldots,l\}$ tako da $[v_i]_L = x_j$. Neka je f: $P \to X$, gdje je $P = \{p_1,\ldots, p_n\}$ i $X = \{x_1,\ldots, x_l\}$, definisano sa $f(p_i) = [v_i]$, $i \in \{1,\ldots,n\}$. Označimo sa $[f]x_i = \{p \in P| f(p) = x_i\}$. Neka je $|[f]x_i| = n_i$ i $[f]x_i = \{ p_1^i, \ldots, p_{n_i}^i \}$, $i \in \{1,\ldots,l\}$.

Neka je $Ap_j = (A, Q_j, B, \varphi_j, \psi_j, q_1^j, Q_F)$ inicijalni automat, gdje je $Q_j = \{ q_1^j,\ldots, q_{s_j+1}^j, q_2^{-j},\ldots, q_{s_j+1}^{-j} \} \cup Q_F$, $j \in \{1,\ldots, n\}$, definisan sa:

$\varphi_j (q_k^j, [v_{i_{k-1}}^j]) = q_{k+1}^j$, $\psi_j (q_k^j,[v_{i_{k-1}}^j]) = |v_{i_{k-1}}^j v_{i_k}^j|$,

$\varphi_j (q_k^j, a) = q_k^{-j}$, $\psi_j (q_k^j, a) = |v_{i_{k-1}}^j v_{i_k}^j|^{-1}$, za $a \neq [v_{i_{k-1}}^j]$, $k \in \{2,\ldots, s_j \}$,

$\varphi_j (q_1^j, [v_j]) = q_2^j$, $\psi_j (q_1^j, [v_j]) = |v_j v_{i_1}^j|$,

$\varphi_j (q_1^j, a) = q_{F_0}$, $\psi_j (q_1^j, a) = 0$, za $a \neq [v_j]$,

$\varphi_j (q_{s_j+1}^j, [v_{i_{s_j}}^j]) = q_{F_1}$, $\psi_j (q_{s_j+1}^j, [v_{i_{s_j}}^j]) = 0$,

$\varphi_j (q_{s_j+1}^j, a) = q_{s_j+1}^{-j}$, $\psi_j (q_{s_j+1}^j, a) = |v_{s_j-1}^j v_{s_j}^j|^{-1}$, za $a \neq [v_{i_{s_j}}^j]$,

$\varphi_j (q_k^{-j}, [v_{i_{k-2}}^j]) = q_{k-1}^{-j}$, $\psi_j (q_k^{-j}, [v_{i_{k-2}}^j]) = |v_{i_{k-3}}^j v_{i_{k-2}}^j|^{-1}$, $k \in \{4,\ldots, s_j +1 \}$,

$$\varphi_j\left(q_3^{-j}, [v_{i_1}^j]\right) = q_2^{-j}, \quad \psi_j\left(q_3^{-j}, [v_{i_1}^j]\right) = |v_{i_1}^j \, v_j|^{+1},$$

$$\varphi_j\left(q_2^{-j}, a\right) = q_{F_0}, \quad \psi_j\left(q_2^{-j}, a\right) = 0.$$

Primjetimo, automat Ap_j prepoznaje lavirint $(L; v_j)$ i pri tome, ako je mozaični lavirint L_v takav da $L_v \neq (L; v_j)$, tada u obilasku lavirinta L_v automat Ap_j se vraća u čvor v, $j \in \{1,..., n\}$. Sa $q_i(Ap_j)$ označimo stanje $q_{|i|}^{sign(i)j}$ automata Ap_j, $i \in \{1,..., s_j + 1, -2, ..., -(s_j + 1)\}$ (ovu oznaku koristimo i za oznaku isto označenog stanja automata Aq_0, čija definicija slijedi).

Konstruišimo automat $Aq_0 = (A, Q, B, \varphi, \psi, q_0, Q_F)$, gdje je $Q = \{q_0\} \bigcup_{j=1}^{k} Q_j \setminus \{q_1^j\}$, na sljedeći način:

Neka je $m \in \{1, ..., l\}$.

$\varphi(q_0, x_m) = q_2(A\, p_1^m), \quad \psi(q_0, x_m) = |[\, p_1^m\,]_1|_L,$

$\varphi(q_0, a) = q_{F_0}, \quad \psi(q_0, a) = 0, \quad$ za $a \notin X,$

$\varphi(q_{-2}(A\, p_i^m), x_m) = q_2(A\, p_{i+1}^m), \quad \psi(q_{-2}(A\, p_i^m), x_m) = |[\, p_{i+1}^m\,]_1|_L, \quad i \in \{1, ..., n_m - 1\},$

$\varphi(q_{-2}(A\, p_{n_m}^m), x_m) = \varphi_b(q_{-2}(A\, p_{n_m}^m), x_m), \quad \psi(q_{-2}(A\, p_{n_m}^m), x_m) = \psi_b(q_{-2}(A\, p_{n_m}^m), x_m),$ gdje je b takvo da $p_b = p_{n_m}^m,$

$\varphi(q_j^i, a) = \varphi_i(q_j(Ap_i), a), \quad \psi(q_j^i, a) = \psi_i(q_j(Ap_i), a),$ za $j \in \{2,..., s_i + 1, -3, ..., -(s_i + 1)\},$ $i \in \{1,..., k\}.$

$\square$

§ 3.2. Prepoznavanje klasa C_1, C_2, C_3, C_5, C_7 π-lavirinata automatima

Kako ćemo raditi isključivo sa regularnim pješacima, zbog kraćeg zapisivanja, ulazna azbuka je skup $A = \{0,1, ..., 255\}$, umjesto $(E^2)^9$, dobijen kodiranjem $\sum_{i=1}^{8} a_i 2^{i-1}$ elemenata $(1, a_1,...,a_8) \in (E^2)^9$.

U **Glavi 2** smo definisali osnovne familije Φ_i, $1 \le i \le 9$.

Lema 1. Postoji regularni pješak $A_{\Phi_i} = (A, Q_i, B, \varphi_i, \psi_i, q_0, Q_F)$, koji prepoznaje klasu inicijalnih π-lavirinata $(\Phi_i; v_{ND}) = \{(c, v_k) \,|c^{-1}(\{1\}) = K \in \Phi_i$ i v_k ND-tačka skupa $K\}$, $1 \le i \le 9$.

Dokaz : Konstruisaćemo automate A_{Φ_i}, $1 \le i \le 9$.

Izostavićemo sve prelaze u stanje q_{F_0}, smatrajući da to važi za sve $a \in A$ koji nisu naznačeni kao izlaz bilo kog stanja. Takođe ćemo koristiti oznaku $(*, w)$, gdje $w \in D$, smatrajući da to važi za sve $a \in A$ koji nisu već naznačeni (kao izlaz tog stanja).

Automat A_{Φ_1}:

Automat A_{Φ_2}:

Automat A_{Φ_3} :

(223,219,251,235,107,75,203,249,233,105,
215,211,195,67,216,200,72,255,214,210,66,
194,217,201,73,248,232,104; w)

(2,3,8,9,11; 0)

q_{F1}

q_0

(208,80,212,84; w)

(16,144; n)

q_1

(146,18,25,153,147,19,24,152,27,155; n)

(22,23,150,151,31,159; e)

(208,210,211,216,217,219,248,249,251; n)

q_2

(*; e)

Automat A_{Φ_4} :

(107,75,66,67,214,255,
223,214,215; w)

(2,3,11; 0)

(64,208,212; w)

q_0

q_1

(106,254,74,222; w)

q_4

(66,98,214,246; w)

(10; 0)

q_{F1}

(248,252,220,
216,72; w)

(158,30; e)

(16,20,144,148; n)

(64,96,208,212,240,244; w)

(22,23,31,151,159,150; e)

q_2

(208,212,248,252,240,
244,220,216; n)

q_3

(8; 0)

(254,106,246,214,98,66,74,222,158,30,10; e)

(*; e)

(24,28,152,156; n)

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Automat A_{Φ_5} :

Automat A_{Φ_6} :

Automat A_{Φ_7}:

Automat A_{Φ_8}:

Automat A_{Φ_9}:

(24; n)

(66,104,107,214,248,255; w)

q_0 → (208,64; w) / (16; n) → q_1

(2,8,11; 0)

(22,31; n) (248; n)

q_{F1}

q_2

(104; 0)

(107,11,31,255; e)

□

Teorema 3. Postoji regularni pješak $A_i = (A, Q_i, B, \varphi_i, \psi_i, q_0, Q_F)$, koji prepoznaje klasu inicijalnih π-lavirinata $(C_i, v_{DN}) = \{(c, v_k) \mid c \in C_i \text{ i } v_k \text{ DN-tačka skupa } c^{-1}(\{1\})\}$, $i \in \{1, 2, 3, 5\}$ i postoji regularni pješak $A_7 = (A, Q_7, B, \varphi_7, \psi_7, q_0, Q_F)$, koji prepoznaje klasu inicijalnih π-lavirinata $(C_7, v_{ND}) = \{(c, v_k) \mid c \in C_7 \text{ i } v_k \text{ ND-tačka skupa } c^{-1}(\{1\})\}$.

Dokaz: Neka je $i \in \{1,2,3,5,7\}$. Iz definicije klase C_i slijedi da ako je $c \in C_i$, to skup $c^{-1}(\{1\})$ možemo horizontalnim dužima izdijeliti na podskupove C_j, $j \in (1,...,k_i)$, tako da za sve $j \in \{1,..., k_i\}$, postoji $l \in \{1,..., 9\}$ tako da $C_j \in \Phi_l$, gdje je

$$k_i = \begin{cases} 3, & \text{ako je } i = 1, \\ 6, & \text{ako je } i = 2, \\ 10, & \text{ako je } i = 3, \\ 9 & \text{ako je } i = 5, \\ 3 & \text{ako je } i = 7. \end{cases}$$

Konstruišimo automate A_i, $i \in \{1, 2, 3, 5, 7\}$. U opisu ovih automata, smatraćemo da postoji "prioritet" među ulaznim simbolima nekog stanja, definisan sa "prethodno opisan".

Radi boljeg pregleda cijelog teksta ovdje ćemo dati opis konstrukcije automata A_2, a u **Dodatku I** opise konstrukcija automata A_i $i \in \{1, 3, 5, 7\}$.

Automat $A_2 = (A, Q_2, B, \varphi_2, \psi_2, q_1, Q_F)$ je definisan na sljedeći način:

$Q_2 = \{q_i \mid i \in \{1, 2, ..., 35\}\} \cup Q_F$

$\varphi_2(q_1, a) = q_2 \quad \psi_2(q_1, a) = w$ za $a = 208$,

$\varphi_2(q_1, a) = q_4 \quad \psi_2(q_1, a) = w$ za $a = 192$,

$\varphi_2(q_1, a) = q_3 \quad \psi_2(q_1, a) = w$ za $a \in \{80, 96, 112, 224, 240\}$,

$\varphi_2(q_1, a) = q_{F_0} \quad \psi_2(q_1, a) = 0$ inače,

$\varphi_2(q_2, a) = q_2$ $\psi_2(q_2, a) = w$ za $a = 214$,

$\varphi_2(q_2, a) = q_3$ $\psi_2(q_2, a) = w$ za $a \in \{86, 118, 246\}$,

$\varphi_2(q_2, a) = q_{F_0}$ $\psi_2(q_2, a) = 0$ inače,

$\varphi_2(q_3, a) = q_3$ $\psi_2(q_3, a) = w$ za $a \in \{b \in A| \; b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\; a_3 = 0,\; a_6 = 1\}$,

$\varphi_2(q_3, a) = q_3$ $\psi_2(q_3, a) = s$ za $a \in \{b \in A| \; b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\; a_3 = 1,\; a_0 = 0\}$,

$\varphi_2(q_3, a) = q_5$ $\psi_2(q_3, a) = s$ za $a \in \{b \in A| \; b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\; a_1 = 0,\; a_0 = 1\}$,

$\varphi_2(q_3, a) = q_{F_0}$ $\psi_2(q_3, a) = 0$ inače,

$\varphi_2(q_4, a) = q_9$ $\psi_2(q_4, a) = n$ za $a = 22$,

$\varphi_2(q_4, a) = q_8$ $\psi_2(q_4, a) = n$ za $a = 18$,

$\varphi_2(q_4, a) = q_4$ $\psi_2(q_4, a) = w$ za $a \in \{210, 214\}$,

$\varphi_2(q_4, a) = q_3$ $\psi_2(q_4, a) = w$ za $a \in \{118, 246, 86, 242\}$,

$\varphi_2(q_4, a) = q_{F_0}$ $\psi_2(q_4, a) = 0$ inače,

$\varphi_2(q_5, a) = q_6$ $\psi_2(q_5, a) = w$ za $a = 208$,

$\varphi_2(q_5, a) = q_8$ $\psi_2(q_5, a) = w$ za $a \in \{64, 192\}$,

$\varphi_2(q_5, a) = q_5$ $\psi_2(q_5, a) = e$ za $a \in \{b \in A| \; b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\; a_1 = 1,\; a_2 = 0\}$,

$\varphi_2(q_5, a) = q_5$ $\psi_2(q_5, a) = s$ za $a \in \{b \in A| \; b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\; a_1 = 0,\; a_3 = 1\}$,

$\varphi_2(q_5, a) = q_{F_0}$ $\psi_2(q_5, a) = 0$ inače,

$\varphi_2(q_6, a) = q_6$ $\psi_2(q_6, a) = w$ za $a \in \{214, 248, 255\}$,

$\varphi_2(q_6, a) = q_7$ $\psi_2(q_6, a) = n$ za $a \in \{22, 31\}$,

$\varphi_2(q_6, a) = q_8$ $\psi_2 q_6, a) = w$ za $a \in \{104, 232\}$,

$\varphi_2(q_6, a) = q_{F_0}$ $\psi_2(q_6, a) = 0$ inače,

$\varphi_2(q_7, a) = q_7$ $\psi_2(q_7, a) = e$ za $a \in \{27, 31, 107, 235, 251, 255\}$,

$\varphi_2(q_7, a) = q_6$ $\psi_2(q_7, a) = n$ za $a = 248$,

$\varphi_2(q_7, a) = q_8$ $\psi_2(q_7, a) = w$ za $a \in \{104, 232\}$,

$\varphi_2(q_7, a) = q_{F_0}$ $\psi_2(q_7, a) = 0$ inače,

$\varphi_2(q_8, a) = q_8$ $\psi_2(q_8, a) = w$ za $a \in \{66, 107, 194, 210, 235, 251, 255, 248, 214\}$,

$\varphi_2(q_8, a) = q_8$ $\psi_2(q_8, a) = n$ za $a \in \{18, 24, 25, 27, 28, 29\}$,

$\varphi_2(q_8, a) = q_9$ $\psi_2(q_8, a) = n$ za $a \in \{22, 31\}$,

$\varphi_2(q_8, a) = q_{11}$ $\psi_2(q_8, a) = e$ za $a \in \{10, 14\}$,

$\varphi_2(q_8, a) = q_{10}$ $\psi_2(q_8, a) = w$ za $a \in \{124, 252\}$,

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$\varphi_2(q_8, a) = q_{F_0}$ $\psi_2(q_8, a) = 0$ inače,

$\varphi_2(q_9, a) = q_9$ $\psi_2(q_9, a) = e$ za $a \in \{31, 255\}$,
$\varphi_2(q_9, a) = q_8$ $\psi_2(q_9, a) = n$ za $a \in \{248, 249\}$,
$\varphi_2(q_9, a) = q_{10}$ $\psi_2(q_9, a) = w$ za $a \in \{252, 253\}$,
$\varphi_2(q_9, a) = q_{11}$ $\psi_2(q_9, a) = e$ za $a \in \{11, 15\}$,
$\varphi_2(q_9, a) = q_{F_0}$ $\psi_2(q_9, a) = 0$ inače,

$\varphi_2(q_{10}, a) = q_{11}$ $\psi_2(q_{10}, a) = e$ za $a \in \{11, 15\}$,
$\varphi_2(q_{10}, a) = q_{10}$ $\psi_2(q_{10}, a) = w$ za $a \in \{107, 111, 127, 255\}$,
$\varphi_2(q_{10}, a) = q_{11}$ $\psi_2(q_{10}, a) = n$ za $a = 31$,
$\varphi_2(q_{10}, a) = q_{F_0}$ $\psi_2(q_{10}, a) = 0$ inače,

$\varphi_2(q_{11}, a) = q_{11}$ $\psi_2(q_{11}, a) = e$ za $a \in \{66, 70, 86, 98, 106, 107, 102, 110, 111, 118, 126,$
$127, 214, 246, 254, 255, 11, 15\}$,
$\varphi_2(q_{11}, a) = q_{12}$ $\psi_2(q_{11}, a) = w$ za $a \in \{208, 212, 240, 244, 252, 253\}$,
$\varphi_2(q_{11}, a) = q_{13}$ $\psi_2(q_{11}, a) = n$ za $a \in \{80, 84, 112, 116, 124, 125\}$,
$\varphi_2(q_{11}, a) = q_{F_0}$ $\psi_2(q_{11}, a) = 0$ inače.

$\varphi_2(q_{12}, a) = q_{13}$ $\psi_2(q_{12}, a) = n$ za $a \in \{30, 31, 62, 63, 86, 118, 126, 127\}$,
$\varphi_2(q_{12}, a) = q_{12}$ $\psi_2(q_{12}, a) = w$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,$
$a_6 = 1\}$,
$\varphi_2(q_{12}, a) = q_{F_0}$ $\psi_2(q_{12}, a) = 0$ inače

$\varphi_2(q_{13}, a) = q_{13}$ $\psi_2(q_{13}, a) = e$ za $a \in \{43, 47, 107, 111, 127, 255, 254, 126, 246, 214, 63,$
$31, 62, 46, 42, 11, 15, 30, 14, 10, 106, 110, 66, 70, 98, 102, 118, 86\}$,
$\varphi_2(q_{13}, a) = q_{13}$ $\psi_2(q_{13}, a) = n$ za $a \in \{56, 60, 184, 24, 28, 152, 120, 124, 112, 116, 80,$
$84\}$,
$\varphi_2(q_{13}, a) = q_{14}$ $\psi_2(q_{13}, a) = e$ za $a \in \{26, 27, 58, 59, 154, 155, 158, 159, 186, 187, 190,$
$191, 210, 242, 250, 251\}$,
$\varphi_2(q_{13}, a) = q_{12}$ $\psi_2(q_{13}, a) = w$ za $a \in \{208, 212, 240, 244, 248, 252\}$,
$\varphi_2(q_{13}, a) = q_{16}$ $\psi_2(q_{13}, a) = w$ za $a \in \{72, 200, 216\}$,
$\varphi_2(q_{13}, a) = q_{F_0}$ $\psi_2(q_{13}, a) = 0$ inače,

$\varphi_2(q_{14}, a) = q_{14}$ $\psi_2(q_{14}, a) = e$ za $a \in \{106, 107, 210, 214, 234, 235, 242, 246, 250, 251,$
$254, 255\}$,
$\varphi_2(q_{14}, a) = q_{15}$ $\psi_2(q_{14}, a) = w$ za $a \in \{104, 105, 96, 208, 192, 224, 232, 233\}$,
$\varphi_2(q_{14}, a) = q_{16}$ $\psi_2(q_{14}, a) = n$ za $a \in \{240, 248, 249\}$,
$\varphi_2(q_{14}, a) = q_{F_0}$ $\psi_2(q_{14}, a) = 0$ inače,

$\varphi_2(q_{15}, a) = q_{16}$ $\psi_2(q_{15}, a) = n$ za $a \in \{26, 27, 58, 59, 154, 155, 186, 187, 210, 242, 250, 251\}$,

$\varphi_2(q_{15}, a) = q_{15}$ $\psi_2(q_{15}, a) = w$ za $a \in \{106, 107, 234, 235\}$,

$\varphi_2(q_{15}, a) = q_{F_0}$ $\psi_2(q_{15}, a) = 0$ inače,

$\varphi_2(q_{16}, a) = q_{16}$ $\psi_2(q_{16}, a) = w$ za $a \in \{214, 66, 194, 210, 216, 200, 72, 107, 235, 75, 203, 215, 255, 223, 251, 219, 217, 201, 73, 67, 195, 211, 248, 232, 104, 249, 233, 105\}$,

$\varphi_2(q_{16}, a) = q_{16}$ $\psi_2(q_{16}, a) = n$ za $a \in \{18, 19, 24, 25, 27, 146, 147, 152, 153, 155\}$,

$\varphi_2(q_{16}, a) = q_{17}$ $\psi_2(q_{16}, a) = e$ za $a \in \{22, 23, 31, 63, 150, 151, 159\}$,

$\varphi_2(q_{16}, a) = q_{18}$ $\psi_2(q_{16}, a) = w$ za $a \in \{99, 227, 95, 127, 83, 115, 242, 243, 87, 247, 119, 91, 123, 98, 226, 82, 114, 86, 118, 246\}$,

$\varphi_2(q_{16}, a) = q_{F_0}$ $\psi_2(q_{16}, a) = 0$ inače,

$\varphi_2(q_{17}, a) = q_{16}$ $\psi_2(q_{17}, a) = n$ za $a \in \{248, 249, 251, 210, 211, 216, 217, 219\}$,

$\varphi_2(q_{17}, a) = q_{17}$ $\psi_2(q_{17}, a) = e$ za $a \in \{ b \in A| b = a_0+a_12+a_22^2+a_32^3+a_42^4+a_52^5+a_62^6+a_72^7, a_1 = 1\}$,

$\varphi_2(q_{17}, a) = q_{F_0}$ $\psi_2(q_{17}, a) = 0$ inače,

$\varphi_2(q_{18}, a) = q_{18}$ $\psi_2(q_{18}, a) = w$ za $a \in \{66, 67, 75, 98, 99, 102, 107, 70, 71, 103, 79, 111\}$,

$\varphi_2(q_{18}, a) = q_{19}$ $\psi_2(q_{18}, a) = s$ za $a \in \{10, 14, 42, 46, 106, 110, 122, 126, 62, 30, 234, 250, 254\}$,

$\varphi_2(q_{18}, a) = q_{F_0}$ $\psi_2(q_{18}, a) = 0$ inače,

$\varphi_2(q_{19}, a) = q_{19}$ $\psi_2(q_{19}, a) = w$ za $a \in \{66, 98, 255, 127, 254, 126, 214, 86, 246, 252, 244, 212, 124, 84, 116, 111, 110, 102, 70, 120, 112, 80, 107, 106\}$,

$\varphi_2(q_{19}, a) = q_{19}$ $\psi_2(q_{19}, a) = s$ za $a \in \{30, 62, 10, 42, 28, 60, 46, 14, 24, 56\}$,

$\varphi_2(q_{19}, a) = q_{21}$ $\psi_2(q_{19}, a) = e$ za $a \in \{2, 6, 22\}$,

$\varphi_2(q_{19}, a) = q_{20}$ $\psi_2(q_{19}, a) = e$ za $a \in \{31, 63, 43, 47, 11, 15\}$,

$\varphi_2(q_{19}, a) = q_{21}$ $\psi_2(q_{19}, a) = n$ za $a \in \{16, 22\}$,

$\varphi_2(q_{19}, a) = q_{F_0}$ $\psi_2(q_{19}, a) = 0$ inače,

$\varphi_2(q_{20}, a) = q_{19}$ $\psi_2(q_{20}, a) = s$ za $a \in \{106, 110, 120, 124, 126, 248, 252, 254\}$,

$\varphi_2(q_{20}, a) = q_{20}$ $\psi_2(q_{20}, a) = e$ za $a \in \{ b \in A| b = a_0+a_12+a_22^2+a_32^3+a_42^4+a_52^5+a_62^6+a_72^7, a_1 = 1\}$,

$\varphi_2(q_{20}, a) = q_{F_0}$ $\psi_2(q_{20}, a) = 0$ inače,

$\varphi_2(q_{21}, a) = q_{22}$ $\psi_2(q_{21}, a) = e$ za $a \in \{215, 87, 71, 67, 83, 211, 195, 115, 243, 227, 247, 119, 103, 99\}$,

$\varphi_2(q_{21}, a) = q_{21}$ $\psi_2(q_{21}, a) = n$ za $a \in \{ b \in A| b = a_0+a_12+a_22^2+a_32^3+a_42^4+a_52^5+a_62^6+a_72^7, a_1 = 0, a_4 = 1\}$,

$\varphi_2(q_{21}, a) = q_{21}$ $\psi_2(q_{21}, a) = e$ za $a \in \{ b \in A| b = a_0+a_12+a_22^2+a_32^3+a_42^4+a_52^5+a_62^6+a_72^7, a_1 = 1\}$,

$\varphi_2(q_{21}, a) = q_{F_0}$ $\psi_2(q_{21}, a) = 0$ inače,

$\varphi_2(q_{22}, a) = q_{23}$ $\psi_2(q_{22}, a) = w$ za $a \in \{200, 201, 232, 233, 216, 217, 248, 249\}$,
$\varphi_2(q_{22}, a) = q_{28}$ $\psi_2(q_{22}, a) = w$ za $a \in \{72, 73, 104, 105\}$,
$\varphi_2(q_{22}, a) = q_{22}$ $\psi_2(q_{22}, a) = e$ za $a \in \{$ $b \in A|$ $b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7$,
$a_1 = 1\}$,
$\varphi_2(q_{22}, a) = q_{F_0}$ $\psi_2(q_{22}, a) = 0$ inače,

$\varphi_2(q_{23}, a) = q_{23}$ $\psi_2(q_{23}, a) = w$ za $a \in \{210, 211, 242, 243, 219, 251, 214, 246, 255, 223,$
$247, 215\}$,
$\varphi_2(q_{23}, a) = q_{24}$ $\psi_2(q_{23}, a) = w$ za $a \in \{91, 95, 82, 83, 115, 86, 87, 119, 114, 118\}$,
$\varphi_2(q_{23}, a) = q_{30}$ $\psi_2(q_{23}, a) = e$ za $a \in \{30, 62\}$,
$\varphi_2(q_{23}, a) = q_{26}$ $\psi_2(q_{23}, a) = w$ za $a \in \{122, 126\}$,
$\varphi_2(q_{23}, a) = q_{25}$ $\psi_2(q_{23}, a) = w$ za $a \in \{123, 127\}$,
$\varphi_2(q_{23}, a) = q_{27}$ $\psi_2(q_{23}, a) = w$ za $a \in \{250, 254\}$,
$\varphi_2(q_{23}, a) = q_{F_0}$ $\psi_2(q_{23}, a) = 0$ inače,

$\varphi_2(q_{24}, a) = q_{24}$ $\psi_2(q_{24}, a) = w$ za $a \in \{66, 67, 70, 71, 98, 99, 102, 103\}$,
$\varphi_2(q_{24}, a) = q_{26}$ $\psi_2(q_{24}, a) = w$ za $a \in \{106, 110\}$,
$\varphi_2(q_{24}, a) = q_{30}$ $\psi_2(q_{24}, a) = e$ za $a \in \{10, 14, 42, 46\}$,
$\varphi_2(q_{24}, a) = q_{F_0}$ $\psi_2(q_{24}, a) = 0$ inače,

$\varphi_2(q_{25}, a) = q_{25}$ $\psi_2(q_{25}, a) = w$ za $a \in \{107, 111\}$,
$\varphi_2(q_{25}, a) = q_{24}$ $\psi_2(q_{25}, a) = w$ za $a \in \{75, 79\}$,
$\varphi_2(q_{25}, a) = q_{F_0}$ $\psi_2(q_{25}, a) = 0$ inače,

$\varphi_2(q_{26}, a) = q_{26}$ $\psi_2(q_{26}, a) = w$ za $a \in \{107, 111\}$,
$\varphi_2(q_{26}, a) = q_{30}$ $\psi_2(q_{26}, a) = e$ za $a \in \{11, 15, 43, 47\}$,
$\varphi_2(q_{26}, a) = q_{F_0}$ $\psi_2(q_{26}, a) = 0$ inače,

$\varphi_2(q_{27}, a) = q_{27}$ $\psi_2(q_{27}, a) = w$ za $a \in \{251, 255\}$,
$\varphi_2(q_{27}, a) = q_{26}$ $\psi_2(q_{27}, a) = w$ za $a \in \{123, 127\}$,
$\varphi_2(q_{27}, a) = q_{30}$ $\psi_2(q_{27}, a) = e$ za $a \in \{31, 63\}$,
$\varphi_2(q_{27}, a) = q_{F_0}$ $\psi_2(q_{27}, a) = 0$ inače,

$\varphi_2(q_{28}, a) = q_{28}$ $\psi_2(q_{28}, a) = w$ za $a \in \{66, 67, 75, 98, 99, 107\}$,
$\varphi_2(q_{28}, a) = q_{23}$ $\psi_2(q_{28}, a) = w$ za $a \in \{194, 195, 203, 226, 227, 235\}$,
$\varphi_2(q_{28}, a) = q_{29}$ $\psi_2(q_{28}, a) = w$ za $a = 106$,
$\varphi_2(q_{28}, a) = q_{27}$ $\psi_2(q_{28}, a) = w$ za $a = 234$,
$\varphi_2(q_{28}, a) = q_{F_1}$ $\psi_2(q_{28}, a) = 0$ za $a \in \{10, 42\}$,

$\varphi_2(q_{28}, a) = q_{F_0} \quad \psi_2(q_{28}, a) = 0$ inače,

$\varphi_2(q_{29}, a) = q_{29} \quad \psi_2(q_{29}, a) = w$ za $a = 107$,

$\varphi_2(q_{29}, a) = q_{27} \quad \psi_2(q_{29}, a) = w$ za $a = 235$,

$\varphi_2(q_{29}, a) = q_{F_1} \quad \psi_2(q_{29}, a) = 0$ za $a \in \{11, 43\}$,

$\varphi_2(q_{29}, a) = q_{F_0} \quad \psi_2(q_{29}, a) = 0$ inače,

$\varphi_2(q_{30}, a) = q_{31} \quad \psi_2(q_{30}, a) = n$ za $a \in \{82, 83, 91, 114, 115, 122, 123, 210, 211, 216, 219, 217, 242, 248, 249, 250, 251, 243\}$,

$\varphi_2(q_{30}, a) = q_{30} \quad \psi_2(q_{30}, a) = e$ za $a \in \{ b \in A| \ b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 1\}$,

$\varphi_2(q_{30}, a) = q_{F_0} \quad \psi_2(q_{30}, a) = 0$ inače,

$\varphi_2(q_{31}, a) = q_{31} \quad \psi_2(q_{31}, a) = w$ za $a \in \{104, 105, 107, 232, 233, 235\}$,

$\varphi_2(q_{31}, a) = q_{32} \quad \psi_2(q_{31}, a) = w$ za $a \in \{248, 249, 251\}$,

$\varphi_2(q_{31}, a) = q_{31} \quad \psi_2(q_{31}, a) = n$ za $a = 123$,

$\varphi_2(q_{31}, a) = q_{35} \quad \psi_2(q_{31}, a) = s$ za $a = 41$,

$\varphi_2(q_{31}, a) = q_{F_1} \quad \psi_2(q_{31}, a) = 0$ za $a \in \{11, 43\}$,

$\varphi_2(q_{31}, a) = q_{F_0} \quad \psi_2(q_{31}, a) = 0$ inače,

$\varphi_2(q_{32}, a) = q_{34} \quad \psi_2(q_{32}, a) = e$ za $a \in \{31, 63\}$,

$\varphi_2(q_{32}, a) = q_{32} \quad \psi_2(q_{32}, a) = w$ za $a = 255$,

$\varphi_2(q_{32}, a) = q_{33} \quad \psi_2(q_{32}, a) = w$ za $a = 127$,

$\varphi_2(q_{32}, a) = q_{F_0} \quad \psi_2(q_{32}, a) = 0$ inače,

$\varphi_2(q_{33}, a) = q_{34} \quad \psi_2(q_{33}, a) = e$ za $a \in \{11, 15, 31, 43, 47\}$,

$\varphi_2(q_{33}, a) = q_{33} \quad \psi_2(q_{33}, a) = w$ za $a \in \{107, 111\}$,

$\varphi_2(q_{33}, a) = q_{F_0} \quad \psi_2(q_{33}, a) = 0$ inače,

$\varphi_2(q_{34}, a) = q_{31} \quad \psi_2(q_{34}, a) = n$ za $a \in \{248, 249, 251\}$,

$\varphi_2(q_{34}, a) = q_{34} \quad \psi_2(q_{34}, a) = e$ za $a \in \{ b \in A| \ b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 1\}$,

$\varphi_2(q_{34}, a) = q_{F_0} \quad \psi_2(q_{34}, a) = 0$ inače,

$\varphi_2(q_{35}, a) = q_{35} \quad \psi_2(q_{35}, a) = w$ za $a \in \{66, 67, 75, 98, 99, 106, 107, 111, 110, 102, 103, 70, 71, 79, 82, 83, 122, 123, 114, 115, 91\}$,

$\varphi_2(q_{35}, a) = q_{F_1} \quad \psi_2(q_{35}, a) = 0$ za $a \in \{10, 11, 14, 15, 42, 43, 46, 47\}$,

$\varphi_2(q_{35}, a) = q_{F_0} \quad \psi_2(q_{35}, a) = 0$ inače.

□

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§ 3.3. Prepoznavanje klasa C_0, C_4, C_6, C_8, C_9 π-lavirinata automatima

Neka je $z \in K \subseteq \mathbf{Z}^2$. Označimo sa $z_{(i,j)} = \begin{cases} 1, & z + (i,j) \in K, \\ 0, & z + (i,j) \notin K \end{cases}$, $i, j \in \{0,1,-1\}$.

Jasno da $z_{(0,0)} = 1$. Neka je $O(z) = (z_{(1,-1)}, z_{(1,0)}, z_{(1,1)}, z_{(0,-1)}, z_{(0,1)}, z_{(-1,-1)}, z_{(-1,0)}, z_{(-1,1)}) \in \{0,1\}^8$ okolina tačke $z \in K$, i $O(z) = \{z + (i,j) \mid z_{(i,j)} = 1, i, j \in \{0,1,-1\}\}$.

Neka su $a = \{w_1, ..., w_p\} \subseteq \Theta$, $1 \le p \le 4$, i $\lambda \in \mathbf{N}$, $\lambda > 2$. Sa $L(a, x_0, \lambda)$ označimo sljedeću familiju inicijalnih π-lavirinta (c, x_0), gdje je

$$c^{-1}(\{1\}) = [x_0, x_0 + \lambda w_1] \cup ... \cup [x_0, x_0 + \lambda w_p] \cup O(x_0 + \lambda w_1) \cup ... \cup O(x_0 + \lambda w_p),$$

i $O(x_0 + \lambda w_i)$ takvi da važi:

ako je $w_i = e$, tada $O(x_0 + \lambda w_i) = (*, *, *, *, *, 0, 1, 0)$,

ako je $w_i = n$, tada $O(x_0 + \lambda w_i) = (0, *, *, 1, *, 0, *, *)$,

ako je $w_i = w$, tada $O(x_0 + \lambda w_i) = (0, 1, 0, *, *, *, *, *)$,

ako je $w_i = s$, tada $O(x_0 + \lambda w_i) = (*, *, 0, *, 1, *, *, 0)$,

gdje je $* \in \{0, 1\}$.

Tačke $x_0 + j w_i$ označimo sa w_i^j, $j \in \{1, ..., \lambda\}$, $i \in \{1, ..., p\}$.

Sa $L(a, x_0, \lambda, O_1, ..., O_p)$ označimo inicijalni π-lavirint iz familije $L(a, x_0, \lambda)$, kod koga su zadate odgovarajuće okoline "krajnjih" tačaka $O_i = O(w_i^\lambda)$, $i \in \{1, ..., p\}$.

Sa $V(a)$ označimo skup $\{x_0, w_1^\lambda, ..., w_p^\lambda\}$.

Lema 2. Neka je $A = (A, Q, B, \varphi, \psi)$ pješak, takav da $\|Q\| \ge 3$ i neka $\lambda = \|Q\|!$. Tada, za sve $q \in Q$, $a = \{w_1, ..., w_p\} \subseteq \Theta$, $n, m \in \mathbf{N}$, ako je $st(\pi', V(a))$ definisano tada $st(\pi, V(a)) = st(\pi', V(a))$, $pl(\pi', V(a)) = pl(\pi, V(a))$, gdje je $\pi = \pi(A_q, L(a, x_0, n\lambda, O_1, ..., O_p)$, $\pi' = \pi(A_q, L(a, x_0, m\lambda, O_1, ..., O_p)$.

Dokaz: Dovoljno je dokazati da tvrđenje leme važi za $m = 1$.

Ako je $pl(\pi', V(a)) = x_0$, tada razmotrimo dva slučaja:

1) Automat A nije posjetio tačku $w_s^{\lambda-1}$,

2) Automat A je posjetio tačku $w_s^{\lambda-1}$,

za neko $s \in \{1, ..., p\}$.

Ako važi 1) tada je jasno da $pl(\pi, V(a)) = x_0$ i $st(\pi, V(a)) = st(\pi', V(a))$. Razmotrimo slučaj 2).

Neka je

$q_1^{k'} = st(\pi', w_s^{k'})$, $0 \le k' \le \lambda-1$,

$q_2^{k''} = st(\pi, w_s^{k''})$, $0 \le k'' \le n\lambda-1$

(za sada ne možemo tvrditi da vrijednosti $q_2^{k''}$, $1 \le k'' \le n\lambda-1$, postoje, ali to će biti jasno iz onoga što slijedi).

Primjetimo da je $q_1^k = q_2^k$, za sve $0 \le k \le \lambda - 1$.

Kako je $\lambda - 2 > \|Q\|$, to je $q_1^{\lambda-1} = q_1^k$, za neko $k \in \{2, ..., \lambda - 2\}$.

Otuda, $q_2^{k''}$ je definisano (i određeno), $\lambda - 1 < k'' < n\lambda$. Neka je $k_{max} = \max\{ k \in \{2, ..., \lambda - 2\} \mid q_1^{\lambda-1} = q_1^k \}$. Tada je $\lambda - 1 - k_{max} \le \|Q\|$ i pri tome

$q_2^{\lambda-1} = q_2^{\lambda-1+j(\lambda-1-k_{max})}$, za sve $j \in \mathbf{Z}^+$, takve da $\lambda - 1 + j(\lambda - 1 - k_{max}) < n\lambda$.

Ovo posljednje važi i za $j = \lambda(n-1)/(\lambda-1-k_{max})$, tj. $q_1^{\lambda-1} = q_2^{\lambda-1} = q_2^{n\lambda-1}$.

Prema tome, automat A će se naći u istom stanju $q = q_1^{\lambda-1}$ i u čvoru $w_s^{n\lambda-1}$. Kako je $O(w_s^{\lambda-1}) = O(w_s^{\lambda n-1})$, automat A će imati i isti ulazni simbol. Kako je $pl(\pi', V(a)) = x_0$, to se automat A "vraća" ka tački x_0. U ovom "vraćanju" ka tački x_0, u jednom momentu automat A mora posjetiti tačku w_s^1. Slično, prethodnom razmatranju, dokazujemo da će se automat A u oba lavirinta naći u odgovarajućim tačkama (w_s^1) u istom stanju.

Ako je $pl(\pi', V(a)) = w_s^{\lambda}$, tada je automat morao posjetiti tačku $w_s^{\lambda-1}$. Iz prethodnog razmatranja dobijamo $pl(\pi, V(a)) = w_s^{\lambda n}$ i $st(\pi, V(a)) = st(\pi', V(a))$.

$\square$

Neka je s: $\{0,4,6,8,9\} \to \{ND, DN, LN\}$ definisana sa $s(i) = ND$ ako je $i \in \{0, 4, 8\}$, $s(6) = LN$ i $s(9) = DN$.
Neka je $i \in \{0, 4, 6, 8, 9\}$.

Teorema 4. Ne postoji pješak koji prepoznaje klasu $(C_i, \nu_{s(i)}) = \{(c, \nu_{s(i)}) |\ c \in C_i, \nu_{s(i)},$ $s(i)$-tačka skupa $c^{-1}(\{1\})\ \}$.
Dokaz: Pretpostavimo da postoji pješak $A_i = (A, Q_i, B, \varphi_i, \psi_i, q_0)$ koji prepoznaje klasu $(C_i, \nu_{s(i)})$, $i \in \{0, 4, 6, 8, 9\}$. Jasno, $\|Q_i\| > 2$.
Posmatrajmo podklasu C_i' klase C_i, $i \in \{0, 4, 6, 8, 9\}$, definisanu na sljedeći način:

Ako je $\mathbf{i} = 0$, tada:
Neka su $z_i = (x_i, y_i) \in \mathbf{Z}^2$, $i \in \{1, 2\}$, takvi da važi: $\quad 00)\{x_2 < x_1 - 1, \quad y_2 > y_1 + 1$
Tada,
$K_0^{\{z_i\}_{i=\overline{1,2}}} = \{x_1\} \times [y_1, y_2] \cup \{x_2\} \times [y_1, y_2] \cup [x_2, x_1] \times \{y_1\} \cup [x_2, x_1] \times \{y_2\}$.

Klasu C_0' definišemo sa

$$C_0' = \{c : \mathbf{Z}^2 \to \mathbf{E}^2 |\ c^{-1}(\{1\}) = K_0^{\{z_i\}_{i=\overline{1,2}}}\ z_1, z_2\ \text{zadovoljavaju uslov 00)}\ \}.$$

Definišimo lavirint L_0 sa: $V(L_0) = \{v_0, v_1, v_2, v_3\}$, $E(L_0) = \{<v_0, v_1>, <v_1, v_2>, <v_2, v_3>, <v_3, v_0>\}$ i $|(v_0, v_1)| = w$, $|(v_1, v_2)| = n$, $|(v_2, v_3)| = e$, $|(v_3, v_0)| = s$.
Primjetimo da je L_0 n-stepenica (odnosno e-stepenica).

Ako je $\mathbf{i} = 4$, tada:

Neka su $z_i = (x_i, y_i) \in \mathbf{Z}^2$, $i \in \{1, ..., 4\}$, takvi da važi: $04)\begin{cases} x_2 < x_1 - 1, & y_2 > y_1 + 1, \\ x_3 > x_1, & y_3 = y_1, \\ x_4 = x_1, & y_4 < y_1. \end{cases}$

Tada,
$K_4^{\{z_i\}_{i=\overline{1,4}}} = \{x_1\} \times [y_1, y_2] \cup \{x_2\} \times [y_1, y_2] \cup [x_2, x_1] \times \{y_1\} \cup [x_2, x_1] \times \{y_2\} \cup [x_1, x_3] \times \{y_2\} \cup \{x_1\} \times [y_4, y_1]$

Klasu C_4' definišemo sa

$C_4' = \{c : Z^2 \to E^2 \mid c^{-1}(\{1\}) = K_4^{\{z_i\}_{i=\overline{1,4}}} \; z_1, z_2, z_3, z_4, \text{ zadovoljavaju uslove } 04) \}$.

Definišimo lavirint L_4 sa: $V(L_4) = \{v_0, v_1, v_2, v_3, v_4, v_5\}$, $E(L_4) = \{<v_0, v_1>, <v_1, v_2>, <v_2, v_3>, <v_3, v_0>, <v_0, v_4>, <v_0, v_5>\}$ i $|(v_0, v_1)| = w$, $|(v_1, v_2)| = n$, $|(v_2, v_3)| = e$, $|(v_3, v_0)| = s$, $|(v_0, v_4)| = e$, $|(v_0, v_5)| = s$.

Primjetimo da je $L_4 \in$ **Step**, gdje je **Step** ranije definisana familija lavirinata.

Ako je **i** $= 6$, tada:

Neka su $z_i = (x_i, y_i) \in Z^2$, $i \in \{1, ..., 5\}$ takvi da važi: $06)$
$$\begin{cases} x_2 < x_1 - 1, & y_2 > y_1 + 1, \\ x_3 = x_2, & y_3 > y_2 + 2, \\ x_4 > x_3 + 1, & y_4 = y_3, \\ x_5 = x_4, & y_2 < y_5 + 1 < y_4. \end{cases}$$

Tada,

$K_6^{\{z_i\}_{i=\overline{1,5}}} = \{x_1\} \times [y_1, y_2] \cup \{x_2\} \times [y_1, y_2] \cup [x_2, x_1] \times \{y_1\} \cup [x_2, x_1] \times \{y_2\} \cup \{x_2\} \times [y_2, y_3]$
$\cup [x_3, x_4] \times \{y_3\} \cup \{x_4\} \times [y_5, y_4]$.

Klasu C_6' definišemo sa

$C_6' = \{ c : Z^2 \to E^2 \mid c^{-1}(\{1\}) = K_6^{\{z_i\}_{i=\overline{1,5}}} \; z_1, z_2, z_3, z_4, z_5 \text{ zadovoljavaju uslove } 06) \}$.

Definišimo lavirint L_6 sa: $V(L_6) = \{v_0, v_1, v_2, v_3, v_4, v_5, v_6\}$, $E(L_6) = \{<v_0, v_1>, <v_1, v_2>, <v_2, v_3>, <v_3, v_0>, <v_2, v_4>, <v_4, v_5>, <v_5, v_6>\}$ i $|(v_0, v_1)| = w$, $|(v_1, v_2)| = n$, $|(v_2, v_3)| = e$, $|(v_3, v_0)| = s$, $|(v_2, v_4)| = n$, $|(v_4, v_5)| = e$, $|(v_5, v_6)| = s$.

Primjetimo da je $L_6 \in$ **Step**.

Ako je **i** $= 9$, tada:

Neka su $z_i = (x_i, y_i) \in Z^2$, $i \in \{1, ..., 5\}$ takvi da važi:

$09)$
$$\begin{cases} x_2 < x_1 - 1, & y_2 > y_1 + 1, \\ x_3 = x_1, & y_3 < y_1 - 2, \\ x_4 < x_1 - 2, & y_4 = y_3, \\ x_5 = x_4, & y_1 > y_5 + 1 > y_4 + 1. \end{cases}$$

Tada,

$K_9^{\{z_i\}_{i=\overline{1,5}}} = \{x_1\} \times [y_1, y_2] \cup \{x_2\} \times [y_1, y_2] \cup [x_2, x_1] \times \{y_1\} \cup [x_2, x_1] \times \{y_2\} \cup \{x_1\} \times [y_3, y_1]$
$\cup [x_4, x_3] \times \{y_3\} \cup \{x_4\} \times [y_4, y_5]$.

Klasu C_9' definišemo sa

$C_9' = \{ c : Z^2 \to E^2 \mid c^{-1}(\{1\}) = K_9^{\{z_i\}_{i=\overline{1,5}}} \; z_1, z_2, z_3, z_4, z_5 \text{ zadovoljavaju uslov } 09) \}$.

Definišimo lavirint L_9 sa: $V(L_9) = \{v_0, v_1, v_2, v_3, v_4, v_5, v_6\}$, $E(L_9) = \{<v_0, v_1>, <v_1, v_2>, <v_2, v_3>, <v_3, v_0>, <v_0, v_4>, <v_4, v_5>, <v_5, v_6>\}$ i $|(v_0, v_1)| = w$, $|(v_1, v_2)| = n$, $|(v_2, v_3)| = e$, $|(v_3, v_0)| = s$, $|(v_0, v_4)| = s$, $|(v_4, v_5)| = w$, $|(v_5, v_6)| = n$.

Primjetimo da je $L_9 \in$ **Step**.

Ako je i = 8, tada:

Neka su $z_i = (x_i, y_i) \in Z^2$, $i \in \{1, ..., 3\}$ takvi da važi: 08)$\begin{cases} x_2 < x_1 - 1, & y_2 > y_1 + 1, \\ x_3 = x_1, & y_3 > y_2 + 1. \end{cases}$

Tada,

$K_8^{\{z_i\}_{i=\overline{1,3}}} = \{x_1\} \times [y_1, y_2] \cup \{x_2\} \times [y_1, y_2] \cup [x_2, x_1] \times \{y_1\} \cup [x_2, x_1] \times \{y_2\} \cup \{x_1\} \times [y_2, y_3]$
$\cup [x_2, x_3] \times \{y_2\} \cup \{x_2\} \times [y_2, y_3]$.

Klasu C_8' definišemo sa

$C_8' = \{ c : Z^2 \to E^2 | c^{-1}(\{1\}) = K_8^{\{z_i\}_{i=\overline{1,3}}}$ z_1, z_2, z_3 zadovoljavaju uslov 08) $\}$.

Definišimo lavirint L_8 sa: $V(L_8) = \{v_0, v_1, v_2, v_3, v_4, v_5\}$, $E(L_8) = \{< v_0, v_1>, < v_1, v_2>, < v_2, v_3>, < v_3, v_0>, < v_3, v_4>, < v_4, v_5>, < v_5, v_2>\}$ i $|(v_0, v_1)| = w$, $|(v_1, v_2)| = n$, $|(v_2, v_3)| = e$, $|(v_3, v_0)| = s$, $|(v_3, v_4)| = n$, $|(v_4, v_5)| = w$, $|(v_5, v_2)| = s$.
Primjetimo da je $L_8 \in$ **Step**.

Neka je $\tilde{L}_i$ lavirint dobijen iz lavirinta L_i kao u **Teoremi 2**, gdje je $n = \|Q_i\|$. Neka je on smješten u ravni R^2, kako je to opisano u ovoj teoremi. Iz ovako smještenog lavirinta možemo, rastezanjem grana, dobiti lavirint L_i' [14], tako da svi čvorovi smještenog lavirinta pripadaju Z^2 s korakom $\lambda_i = \|Q_i\|!$. Posmatrajmo inicijalni π-lavirint $(c_i, v_{s(i)})$, gdje je $c_i^{-1}(\{1\}) = V(L_i')$, i ponašanje automata A_i u njemu. Iz **Leme 2**, iz geometrije lavirinta C_i, i činjenice da ako automat prepoznaje lavirint L, to će jedan te isti čvor lavirinta L biti posjećen najviše $\|Q_i\|$ puta, slijedi da će automat A_i u jednom momentu biti u stanju q_{F_i}.

$\square$

Teorema 5. Postoji kolektiv (A_i, K_i) tipa $(1,1)$ koji prepoznaje klasu $(C_i, v_{s(i)}) = \{(c, v_{s(i)})| c \in C_i, v_{s(i)}$, s(i)-tačka skupa $c^{-1}(\{1\}) \}$, A_i – pješak, $i \in \{0, 4, 6, 8, 9\}$.
Dokaz: Primjetimo, da je okolina tačke u kojoj se nalazi jedina informacija koju automat ima u bilo kom trenutku, odnosno, nema informaciju da li se nalazi u "okolini" rupe ili beskonačne (spoljne) oblasti (vidjeti dokaz **Teoreme 2** (ili **Teoreme 4**)). Potrebna mu je još neka informacija.
Opišimo funkcionisanje kolektiva automata (A_i, K_i), koji će biti konstruisani.
Neka je $i \in \{0, 4, 6, 8, 9\}$. Iz definicije klase C_i slijedi da ako je $c \in C_i$, to skup $c^{-1}(\{1\})$ možemo horizontalnim dužima izdijeliti na podskupove C_j, $j \in (1,...,k_i)$, tako da za sve $j \in \{1,..., k_i\}$, postoji $l \in \{1,..., 9\}$ tako da $C_j \in \Phi_l$, gdje je

$k_i = \begin{cases} 6, & \text{ako je } i = 0, \\ 5, & \text{ako je } i = 4, \quad i \ k_i \in \{9, 10\}, \text{ako je } i \in \{6, 9\}. \\ 12 & \text{ako je } i = 8. \end{cases}$

Neka je $i \in \{0, 4, 6, 9, 8\}$. Neka je $c \in C_i$ i $c^{-1}(\{1\}) = K$. Uočimo tačku z_1 iz definicije elementa K. Uvijek možemo konstruisati automat koji polazi iz tačke $v_{s(i)}$ (nekada je to tačka z_1) i dolazi do tačke z_1, pa možemo smatrati da automat započinje kretanje u tački

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z_1 skupa K. Krećući se po skupu K, na sličan način kako to rade automati iz **Leme 1**, u jednom momentu automat (i kamen koji je stalno uz njega) nailazi na rupu. Automat kamen K_i se tada "razdvaja" od automata, pamteći da je automat A_i bio u toj tački. U daljem ponašanju automata A_i zahtjeva se da u obilasku rupe u jednom te istom smjeru, on ponovo posjeti tu tačku, tj. automat A_i obilazi rupu.

Konstruišimo kolektive $S_i = (A_i, K_i)$, $i \in \{0, 4, 6, 9, 8\}$.

U opisu automata A_i, smatraćemo da postoji "prioritet" među ulaznim simbolima nekog stanja tog automata, definisan sa "prethodno opisan". Takođe ćemo u opisu automata A_i, izostaviti kod stanja automata kamena K_i, osim u onom dijelu gdje funkcionisanje automata A_i, zavisi od "prisustva" automata kamena K_i.

Radi boljeg pregleda teksta, ovdje ćemo dati opis konstrukcije kolektiva $S_0 = (A_0, K_0)$, a u **Dodatku II** opise konstrukcija kolektiva $S_i = (A_i, K_i)$, $i \in \{4, 6, 8, 9\}$.

Kolektiv $S_0 = (A_0, K_0)$ je definisan na sljedeći način:

$Q_0 = \{q_i \mid i \in \{1, ..., 40\}\} \cup Q_F$,

$\varphi_0(q_1, a) = q_4 \quad \psi_0(q_1, a) = n$ za $a = 148$,

$\varphi_0(q_1, a) = q_2 \quad \psi_0(q_1, a) = w$ za $a \in \{208, 212\}$,

$\varphi_0(q_1, a) = q_9 \quad \psi_0(q_1, a) = w$ za $a \in \{80, 84\}$,

$\varphi_0(q_1, a) = q_{F_0} \quad \psi_0(q_1, a) = 0$ inače,

$\varphi_0(q_2, a) = q_2 \quad \psi_0(q_2, a) = w$ za $a \in \{255, 223, 214, 215, \}$,

$\varphi_0(q_2, a) = q_3 \quad \psi_0(q_2, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_0(q_2, a) = q_9 \quad \psi_0(q_2, a) = w$ za $a \in \{127, 95, 86, 87\}$,

$\varphi_0(q_2, a) = q_{F_0} \quad \psi_0(q_2, a) = 0$ inače,

$\varphi_0(q_3, a) = q_4 \quad \psi_0(q_3, a) = n$ za $a \in \{208, 212, 240, 244, 248, 252\}$,

$\varphi_0(q_3, a) = q_3 \quad \psi_0(q_3, a) = e$ za $a \in \{ b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, \ a_1 = 1\}$,

$\varphi_0(q_3, a) = q_{F_0} \quad \psi_0(q_3, a) = 0$ inače,

$\varphi_0(q_4, a) = q_5 \quad \psi_0(q_4, a) = w$ za $a \in \{208, 212, 240, 244\}$,

$\varphi_0(q_4, a) = q_2 \quad \psi_0(q_4, a) = w$ za $a \in \{248, 252\}$,

$\varphi_0(q_4, a) = q_6 \quad \psi_0(q_4, a) = e$ za $a \in \{74, 78, 202, 94, 206, 218, 106, 110, 234, 126, 238, 250, 210, 242\}$,

$\varphi_0(q_4, a) = q_4 \quad \psi_0(q_4, a) = e$ za $a \in \{214, 246, 222, 254\}$,

$\varphi_0(q_4, a) = q_9 \quad \psi_0(q_4, a) = w$ za $a \in \{120, 124\}$,

$\varphi_0(q_4, a) = q_{F_0} \quad \psi_0(q_4, a) = 0$ inače,

$\varphi_0(q_5, a) = q_5 \quad \psi_0(q_5, a) = w$ za $a \in \{214, 246\}$,

$\varphi_0(q_5, a) = q_2 \quad \psi_0(q_5, a) = w$ za $a \in \{222, 254\}$,

$\varphi_0(q_5, a) = q_{F_0} \quad \psi_0(q_5, a) = 0$ inače,

$\varphi_0(q_6, a) = q_6$ $\psi_0(q_6, a) = e$ za $a \in \{98, 102, 118, 246, 226, 230, 66, 70, 86, 214, 194, 198\}$,

$\varphi_0(q_6, a) = q_7$ $\psi_0(q_6, a) = w$ za $a \in \{112, 116, 244, 240, 80, 84, 208, 212\}$,

$\varphi_0(q_6, a) = q_{F_0}$ $\psi_0(q_6, a) = 0$ inače,

$\varphi_0(q_7, a) = q_7$ $\psi_0(q_7, a) = w$ za $a \in \{98, 102, 118, 246, 66, 70, 86, 214, 242, 210\}$,

$\varphi_0(q_7, a) = q_8$ $\psi_0(q_7, a) = w$ za $a \in \{74, 78, 94, 218, 106, 110, 126, 250, 254, 222\}$,

$\varphi_0(q_7, a) = q_7$ $\psi_0(q_7, a) = w$ za $a \in \{194, 198, 226, 230\}$,

$\varphi_0(q_7, a) = q_8$ $\psi_0(q_7, a) = w$ za $a \in \{202, 206, 234, 238\}$,

$\varphi_0(q_7, a) = q_{F_0}$ $\psi_0(q_7, a) = 0$ inače,

$\varphi_0(q_8, a) = q_8$ $\psi_0(q_8, a) = w$ za $a \in \{255, 223, 215, 251, 219, 211, 71, 79, 111, 107, 75, 67, 214, 66, 210\}$,

$\varphi_0(q_8, a) = q_{10}$ $\psi_0(q_8, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_0(q_8, a) = q_{11}$ $\psi_0(q_8, a) = n$ za $a \in \{18, 19, 27, 146, 147, 155\}$,

$\varphi_0(q_8, a) = q_8$ $\psi_0(q_8, a) = w$ za $a \in \{194, 195, 198, 199, 203, 207, 235, 239\}$,

$\varphi_0(q_8, a) = q_{F_0}$ $\psi_0(q_8, a) = 0$ inače,

$\varphi_0(q_9, a) = q_9$ $\psi_0(q_9, a) = w$ za $a \in \{211, 67, 210, 66, 255, 223, 70, 71, 107, 75, 215, 111, 79, 219, 251, 214\}$,

$\varphi_0(q_9, a) = q_{10}$ $\psi_0(q_9, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_0(q_9, a) = q_{11}$ $\psi_0(q_9, a) = n$ za $a \in \{18, 19, 27, 146, 147, 155\}$,

$\varphi_0(q_9, a) = q_9$ $\psi_0(q_9, a) = w$ za $a \in \{194, 195, 198, 199, 203, 207, 235, 239\}$,

$\varphi_0(q_9, a) = q_{F_0}$ $\psi_0(q_9, a) = 0$ inače,

$\varphi_0(q_{10}, a) = q_{11}$ $\psi_0(q_{10}, a) = n$ za $a \in \{210, 211, 219, 218, 250, 251, 242\}$,

$\varphi_0(q_{10}, a) = q_{10}$ $\psi_0(q_{10}, a) = e$ za $a \in \{$ $b \in A|$ $b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7$, $a_1 = 1\}$,

$\varphi_0(q_{10}, a) = q_{F_0}$ $\psi_0(q_{10}, a) = 0$ inače,

$\varphi_0(q_{11}, a) = q_{11}$ $\psi_0(q_{11}, a) = w$ za $a \in \{214, 66, 194, 210, 248, 104, 232, 203, 215, 211, 67, 195, 216, 200, 72, 255, 223, 251, 219, 107, 75, 235, 249, 233, 105, 217, 201, 73\}$,

$\varphi_0(q_{11}, a) = q_{11}$ $\psi_0(q_{11}, a) = n$ za $a \in \{18, 19, 24, 25, 28, 29, 27, 146, 147, 152, 153, 155\}$,

$\varphi_0(q_{11}, a) = q_{12}$ $\psi_0(q_{11}, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_0(q_{11}, a) = q_{13}$ $\psi_0(q_{11}, a) = w$ za $a \in \{253, 125, 221, 93, 95, 127, 88, 92, 220, 252, 124, 120, 121, 89\}$,

$\varphi_0(q_{11}, a) = q_{15}$ $\psi_0(q_{11}, a) = e$ za $a \in \{10, 14, 30\}$,

$\varphi_0(q_{11}, a) = q_{F_0}$ $\psi_0(q_{11}, a) = 0$ inače,

$\varphi_0(q_{12}, a) = q_{11}$ $\psi_0(q_{12}, a) = n$ za $a \in \{210, 211, 216, 217, 219, 248, 249, 251\}$,

$\varphi_0(q_{12}, a) = q_{12}$ $\psi_0(q_{12}, a) = e$ za $a \in \{$ $b \in A|$ $b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7$, $a_1 = 1\}$,

$\varphi_0(q_{12}, a) = q_{F_0}$ $\psi_0(q_{12}, a) = 0$ inače,

$\varphi_0(q_{13}, a) = q_{13}$ $\psi_0(q_{13}, a) = w$ za $a \in \{107, 111, 214, 223, 255, 127, 215, 95\}$,
$\varphi_0(q_{13}, a) = q_{14}$ $\psi_0(q_{13}, a) = e$ za $a \in \{11, 15, 7, 43, 47\}$,
$\varphi_0(q_{13}, a) = q_{15}$ $\psi_0(q_{13}, a) = n$ za $a \in \{22, 23, 31, 63\}$,
$\varphi_0(q_{13}, a) = q_{F_0}$ $\psi_0(q_{13}, a) = 0$ inače,

$\varphi_0(q_{14}, a) = q_{14}$ $\psi_0(q_{14}, a) = e$ za $a \in \{107, 111, 79\}$,
$\varphi_0(q_{14}, a) = q_{15}$ $\psi_0(q_{14}, a) = n$ za $a \in \{88, 89, 92, 93, 95, 125, 127, 120, 121, 124\}$,
$\varphi_0(q_{14}, a) = q_{F_0}$ $\psi_0(q_{14}, a) = 0$ inače,

$\varphi_0(q_{15}, a) = q_{15}$ $\psi_0(q_{15}, a) = e$ za $a \in \{246, 63, 30, 10, 14, 110, 111, 214, 66, 70, 86, 254, 126, 127, 106, 107, 43, 47, 62, 46, 42, 255, 31, 15, 11, 118, 98, 102\}$,
$\varphi_0(q_{15}, a) = q_{15}$ $\psi_0(q_{15}, a) = n$ za $a \in \{56, 60, 124, 120, 24, 28, 112, 116, 80, 84\}$,
$\varphi_0(q_{15}, a) = q_{16}$ $\psi_0(q_{15}, a) = w$ za $a \in \{208, 212, 240, 244, 248, 252\}$,
$\varphi_0(q_{15}, a) = q_{17}$ $\psi_0(q_{15}, a) = e$ za $a \in \{242, 247, 243, 119, 114, 115, 103, 99, 250, 251, 122, 123, 215, 210, 211, 67, 71, 87, 82, 83\}$,
$\varphi_0(q_{15}, a) = q_{F_0}$ $\psi_0(q_{15}, a) = 0$ inače,

$\varphi_0(q_{16}, a) = q_{15}$ $\psi_0(q_{16}, a) = n$ za $a \in \{30, 31, 62, 63, 86, 118, 126, 127\}$,
$\varphi_0(q_{16}, a) = q_{16}$ $\psi_0(q_{16}, a) = w$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_6 = 1\}$,
$\varphi_0(q_{16}, a) = q_{F_0}$ $\psi_0(q_{16}, a) = 0$ inače,

$\varphi_0(q_{17}, a) = q_{17}$ $\psi_0(q_{17}, a) = e$ za $a \in \{66, 67, 106, 107, 98, 99, 194, 195, 226, 227, 234, 235\}$,
$\varphi_0(q_{17}, a) = q_{18}$ $\psi_0(q_{17}, a) = s$ za $a \in \{223, 219, 216, 217, 200, 201, 203, 91, 95, 75, 79, 72, 73\}$,
$\varphi_0(q_{17}, a) = q_{F_0}$ $\psi_0(q_{17}, a) = 0$ inače,

$\varphi_0(q_{18}, a) = q_{18}$ $\psi_0(q_{18}, a) = e$ za $a \in \{107, 66, 67, 75, 31, 22, 23, 235, 203, 194, 195, 27, 18, 19, 255, 251, 223, 219, 214, 210, 215, 211, 159, 151, 150, 155, 146, 147\}$,
$\varphi_0(q_{18}, a) = q_{18}$ $\psi_0(q_{18}, a) = s$ za $a \in \{24, 25, 72, 73, 152, 153, 216, 217, 200, 201, 184, 56\}$,
$\varphi_0(q_{18}, a) = q_{19}$ $\psi_0(q_{18}, a) = w$ za $a \in \{104, 105, 232, 233, 248, 249\}$,
$\varphi_0(q_{18}, a) = q_{20}$ $\psi_0(q_{18}, a) = e$ za $a \in \{154, 158, 30, 62, 63, 59, 58, 26, 254, 250, 186, 187, 190, 191\}$,
$\varphi_0(q_{18}, a) = q_{22}$ $\psi_0(q_{18}, a) = w$ za $a \in \{80, 112, 120\}$,
$\varphi_0(q_{18}, a) = q_{F_0}$ $\psi_0(q_{18}, a) = 0$ inače,

$\varphi_0(q_{19}, a) = q_{18}$ $\psi_0(q_{19}, a) = s$ za $a \in \{223, 219, 203, 75, 31, 159, 27, 155\}$,

$\varphi_0(q_{19}, a) = q_{19}$ $\psi_0(q_{19}, a) = w$ za $a \in \{\ b \in A|\ b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,$
$a_6 = 1\},$

$\varphi_0(q_{19}, a) = q_{F_0}$ $\psi_0(q_{19}, a) = 0$ inače,

$\varphi_0(q_{20}, a) = q_{20}$ $\psi_0(q_{20}, a) = e$ za $a \in \{235, 246, 214, 251, 254, 255, 250, 107\},$
$\varphi_0(q_{20}, a) = q_{21}$ $\psi_0(q_{20}, a) = w$ za $a \in \{208, 212, 224, 240, 244\},$
$\varphi_0(q_{20}, a) = q_{22}$ $\psi_0(q_{20}, a) = s$ za $a \in \{104, 232, 248, 252\},$
$\varphi_0(q_{20}, a) = q_{F_0}$ $\psi_0(q_{20}, a) = 0$ inače,

$\varphi_0(q_{21}, a) = q_{22}$ $\psi_0(q_{21}, a) = s$ za $a \in \{154, 158, 30, 62, 58, 26, 254, 250, 186, 190\},$
$\varphi_0(q_{21}, a) = q_{21}$ $\psi_0(q_{21}, a) = w$ za $a \in \{\ b \in A|\ b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,$
$a_6 = 1\},$

$\varphi_0(q_{21}, a) = q_{F_0}$ $\psi_0(q_{21}, a) = 0$ inače,

$\varphi_0(q_{22}, a) = q_{22}$ $\psi_0(q_{22}, a) = w$ za $a \in \{246, 66, 98, 120, 80, 112, 106, 107, 255, 127, 254,$
$126, 214,$
$86, 118, 248, 240, 208, 70, 102, 110, 124, 116, 84, 252, 244, 212, 111\},$
$\varphi_0(q_{22}, a) = q_{22}$ $\psi_0(q_{22}, a) = s$ za $a \in \{14, 46, 28, 60, 62, 30, 24, 56, 10, 42\},$
$\varphi_0(q_{22}, a) = q_{23}$ $\psi_0(q_{22}, a) = e$ za $a \in \{11, 15, 31, 43, 47, 63\},$
$\varphi_0(q_{22}, a) = q_{24}$ $\psi_0(q_{22}, a) = w$ za $a \in \{222, 78, 95, 223, 94, 74, 79, 75\},$
$\varphi_0(q_{22}, a) = q_{F_0}$ $\psi_0(q_{22}, a) = 0$ inače,

$\varphi_0(q_{23}, a) = q_{22}$ $\psi_0(q_{23}, a) = s$ za $a \in \{126, 120, 106, 124, 252, 248, 110, 254\},$
$\varphi_0(q_{23}, a) = q_{23}$ $\psi_0(q_{23}, a) = e$ za $a \in \{\ b \in A|\ b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,$
$a_1 = 1\},$

$\varphi_0(q_{23}, a) = q_{F_0}$ $\psi_0(q_{23}, a) = 0$ inače,

$\varphi_0(q_{24}, a) = q_{24}$ $\psi_0(q_{24}, a) = w$ za $a \in \{215, 87, 67, 71, 214, 86, 70, 66\},$
$\varphi_0(q_{24}, a) = q_{F_0}$ $\psi_0(q_{24}, a) = 0$ inače,

$\varphi_0(q_{25}, a) = q_{25}$ $\psi_0(q_{25}, a) = e$ za $a \in \{\ b \in A|\ b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,$
$a_1 = 1, a_4 = 0\},$
$\varphi_0(q_{25}, a) = q_{25}$ $\psi_0(q_{25}, a) = n$ za $a \in \{\ b \in A|\ 24 \leq b \leq 31$ ili $56 \leq b \leq 63$ ili $80 \leq b \leq 95$ ili
$112 \leq b \leq 127\},$
$\varphi_0(q_{25}, a) = q_{26}$ $\psi_0(q_{25}, a) = n$ za $a \in \{b \in A|\ 144 \leq b \leq 159$ ili $184 \leq b \leq 191\},$
$\varphi_0(q_{25}, a) = q_{F_0}$ $\psi_0(q_{25}, a) = 0$ inače,

$\varphi_0(q_{26}, a) = q_{26}$ $\psi_0(q_{26}, a) = w$ za $a \in \{\ b \in A|\ 64 \leq b \leq 103$ ili $112 \leq b \leq 119$ ili $192 \leq b \leq 231$ ili
$240 \leq b \leq 247\},$
$\varphi_0(q_{26}, a) = q_{26}$ $\psi_0(q_{26}, a) = n$ za $a \in \{\ b \in A|\ 16 \leq b \leq 29$ ili $b = 31$ ili $144 \leq b \leq 159\},$
$\varphi_0(q_{26}, a) = q_{27}$ $\psi_0(q_{26}, a) = w$ za $a \in \{106, 110, 122, 126, 234, 250, 254\},$

$\varphi_0(q_{26}, a) = q_{30}$ $\psi_0(q_{26}, a) = e$ za $a \in \{10, 42\}$,

$\varphi_0(q_{26}, a) = q_{28}$ $\psi_0(q_{26}, a) = e$ za $a \in \{14, 30, 46, 62\}$,

$\varphi_0(q_{26}, a) = q_{F_0}$ $\psi_0(q_{26}, a) = 0$ inače,

$\varphi_0(q_{27}, a) = q_{27}$ $\psi_0(q_{27}, a) = w$ za $a \in \{107, 111, 127, 123, 235, 251, 255\}$,

$\varphi_0(q_{27}, a) = q_{28}$ $\psi_0(q_{27}, a) = e$ za $a \in \{15, 31, 63, 47\}$,

$\varphi_0(q_{27}, a) = q_{30}$ $\psi_0(q_{27}, a) = e$ za $a \in \{11, 43\}$,

$\varphi_0(q_{27}, a) = q_{F_0}$ $\psi_0(q_{27}, a) = 0$ inače,

$\varphi_0(q_{28}, a) = q_{28}$ $\psi_0(q_{28}, a) = e$ za $a \in \{254, 255, 246, 247, 214, 215, 126, 127, 118, 119, 86, 87\}$,

$\varphi_0(q_{28}, a) = q_{29}$ $\psi_0(q_{28}, a) = e$ za $a \in \{122, 123, 114, 115, 82, 83, 250, 251, 242, 243, 210, 211\}$,

$\varphi_0(q_{28}, a) = q_{31}$ $\psi_0(q_{28}, a) = e$ za $a \in \{95, 223\}$,

$\varphi_0(q_{28}, a) = q_{32}$ $\psi_0(q_{28}, a) = e$ za $a \in \{91, 219\}$,

$\varphi_0(q_{28}, a) = q_{36}$ $\psi_0(q_{28}, a) = n$ za $a \in \{216, 217\}$,

$\varphi_0(q_{28}, a) = q_{F_0}$ $\psi_0(q_{28}, a) = 0$ inače,

$\varphi_0(q_{29}, a) = q_{29}$ $\psi_0(q_{29}, a) = e$ za $a \in \{234, 235, 226, 227, 194, 195, 106, 107, 98, 99, 66, 67\}$,

$\varphi_0(q_{29}, a) = q_{32}$ $\psi_0(q_{29}, a) = e$ za $a \in \{203, 75\}$,

$\varphi_0(q_{29}, a) = q_{35}$ $\psi_0(q_{29}, a) = w$ za $a \in \{200, 201, 72, 73\}$,

$\varphi_0(q_{29}, a) = q_{F_0}$ $\psi_0(q_{29}, a) = 0$ inače,

$\varphi_0(q_{30}, a) = q_{30}$ $\psi_0(q_{30}, a) = e$ za $a \in \{66, 67, 98, 99, 106, 107\}$,

$\varphi_0(q_{30}, a) = q_{28}$ $\psi_0(q_{30}, a) = e$ za $a \in \{110, 111, 102, 103, 70, 71\}$,

$\varphi_0(q_{30}, a) = q_{F_1}$ $\psi_0(q_{30}, a) = 0$ za $a \in \{72, 73\}$,

$\varphi_0(q_{30}, a) = q_{31}$ $\psi_0(q_{30}, a) = e$ za $a = 79$,

$\varphi_0(q_{30}, a) = q_{33}$ $\psi_0(q_{30}, a) = e$ za $a = 75$,

$\varphi_0(q_{30}, a) = q_{F_0}$ $\psi_0(q_{30}, a) = 0$ inače,

$\varphi_0(q_{31}, a) = q_{36}$ $\psi_0(q_{31}, a) = n$ za $a \in \{248, 249\}$,

$\varphi_0(q_{31}, a) = q_{31}$ $\psi_0(q_{31}, a) = e$ za $a \in \{127, 255\}$,

$\varphi_0(q_{31}, a) = q_{32}$ $\psi_0(q_{31}, a) = e$ za $a \in \{123, 251\}$,

$\varphi_0(q_{31}, a) = q_{F_0}$ $\psi_0(q_{31}, a) = 0$ inače,

$\varphi_0(q_{32}, a) = q_{35}$ $\psi_0(q_{32}, a) = w$ za $a \in \{72, 73, 104, 105, 232, 233\}$,

$\varphi_0(q_{32}, a) = q_{32}$ $\psi_0(q_{32}, a) = e$ za $a \in \{107, 235\}$,

$\varphi_0(q_{32}, a) = q_{F_0}$ $\psi_0(q_{32}, a) = 0$ inače,

$\varphi_0(q_{33}, a) = q_{F_1}$ $\psi_0(q_{33}, a) = 0$ za $a \in \{104, 105\}$,

$\varphi_0(q_{33}, a) = q_{33}$ $\psi_0(q_{33}, a) = e$ za $a = 107$,
$\varphi_0(q_{33}, a) = q_{34}$ $\psi_0(q_{33}, a) = e$ za $a = 111$,
$\varphi_0(q_{33}, a) = q_{F_0}$ $\psi_0(q_{33}, a) = 0$ inače,

$\varphi_0(q_{34}, a) = q_{34}$ $\psi_0(q_{34}, a) = e$ za $a \in \{127, 255\}$,
$\varphi_0(q_{34}, a) = q_{36}$ $\psi_0(q_{34}, a) = n$ za $a \in \{248, 249\}$,
$\varphi_0(q_{34}, a) = q_{32}$ $\psi_0(q_{34}, a) = e$ za $a \in \{123, 251\}$,
$\varphi_0(q_{34}, a) = q_{F_0}$ $\psi_0(q_{34}, a) = 0$ inače.

$\varphi_0(q_{35}, a) = q_{36}$ $\psi_0(q_{35}, a) = n$ za $a \in \{210, 114, 115, 122, 123, 82, 242, 243, 250, 251, 219, 83, 211, 91\}$,
$\varphi_0(q_{35}, a) = q_{35}$ $\psi_0(q_{35}, a) = w$ za $a \in \{ b \in A| b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_6 = 1\}$,
$\varphi_0(q_{35}, a) = q_{F_0}$ $\psi_0(q_{35}, a) = 0$ inače,

$\varphi_0(q_{36}, a) = q_{36}$ $\psi_0(q_{36}, a) = n$ za $a = 123$,
$\varphi_0(q_{36}, a) = q_{36}$ $\psi_0(q_{36}, a) = w$ za $a \in \{104, 105, 107, 232, 233, 235\}$,
$\varphi_0(q_{36}, a) = q_{37}$ $\psi_0(q_{36}, a) = w$ za $a \in \{248, 249, 251\}$,
$\varphi_0(q_{36}, a) = q_{40}$ $\psi_0(q_{36}, a) = s$ za $a = 41$,
$\varphi_0(q_{36}, a) = q_{F_1}$ $\psi_0(q_{36}, a) = 0$ za $a \in \{11, 43\}$,

$\varphi_0(q_{36}, a) = q_{F_0}$ $\psi_0(q_{36}, a) = 0$ inače,

$\varphi_0(q_{37}, a) = q_{37}$ $\psi_0(q_{37}, a) = w$ za $a = 255$,
$\varphi_0(q_{37}, a) = q_{39}$ $\psi_0(q_{37}, a) = e$ za $a \in \{31, 63\}$,
$\varphi_0(q_{37}, a) = q_{38}$ $\psi_0(q_{37}, a) = w$ za $a = 127$,
$\varphi_0(q_{37}, a) = q_{F_0}$ $\psi_0(q_{37}, a) = 0$ inače,

$\varphi_0(q_{38}, a) = q_{38}$ $\psi_0(q_{38}, a) = w$ za $a \in \{107, 111\}$,
$\varphi_0(q_{38}, a) = q_{39}$ $\psi_0(q_{38}, a) = e$ za $a \in \{11, 15, 43, 47\}$,
$\varphi_0(q_{38}, a) = q_{F_0}$ $\psi_0(q_{38}, a) = 0$ inače,

$\varphi_0(q_{39}, a) = q_{36}$ $\psi_0(q_{38}, a) = n$ za $a \in \{248, 249, 251\}$,
$\varphi_0(q_{39}, a) = q_{39}$ $\psi_0(q_{39}, a) = e$ za $a \in \{ b \in A| b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 1\}$,
$\varphi_0(q_{39}, a) = q_{F_0}$ $\psi_0(q_{39}, a) = 0$ inače,

$\varphi_0(q_{40}, a) = q_{40}$ $\psi_0(q_{40}, a) = w$ za $a \in \{82, 83, 91, 114, 115, 122, 123, 70, 71, 79, 102, 103, 110, 111, 66, 67, 75, 98, 99, 106, 107\}$,
$\varphi_0(q_{40}, a) = q_{F_1}$ $\psi_0(q_{40}, a) = 0$ za $a \in \{10, 11, 14, 15, 42, 43, 46, 47\}$,

$\varphi_0(q_{40}, a) = q_{F_0}$ $\psi_0(q_{40}, a) = 0$ inače,

Neka je M = {194, 195, 198, 199, 202, 203, 206, 207, 226, 230, 234, 235, 238, 239}$\subseteq$A. Tada,

$\psi_{k0}(q_{k0}, (\{q_i\}, a)) = \psi_0(q_i, (\{q_{k0}\}, a))$ za i$\in$\{1, 2, 3, 4, 5, 6\}, $a \in$A,

$\psi_{k0}(q_{k0}, (\{q_7\}, a)) = 0$ $a \in M_1 = \{202, 206, 234, 238, 194, 198, 226, 230\} \subset M$,
$\psi_{k0}(q_{k0}, (\{q_7\}, a)) = \psi_0(q_7, (\{q_{k0}\}, a))$ za $a \notin M_1$,

$\psi_{k0}(q_{k0}, (\{q_8\}, a)) = 0$ $a \in M_1 = \{195, 194, 203, 239, 207, 235\} \subset M$,
$\psi_{k0}(q_{k0}, (\{q_8\}, a)) = \psi_0(q_8, (\{q_{k0}\}, a))$ za $a \notin M_1$,

$\psi_{k0}(q_{k0}, (\{q_9\}, a)) = 0$ $a \in M_1 = \{195, 194, 203, 239, 207, 235, 198, 199\} \subset M$,
$\psi_{k0}(q_{k0}, (\{q_9\}, a)) = \psi_0(q_9, (\{q_{k0}\}, a))$ za $a \notin M_1$,

$\psi_{k0}(q_{k0}, (\{q_{22}\}, a)) = 0$, $a \in$A,
$\varphi_0(q_{22}, (\{q_{k0}\}, a)) = q_{25}$ $\psi_0(q_{22}, (\{q_{k0}\}, a)) = e$ za $a \in$M \ \{195, 199\}
$\varphi_0(q_{22}, (\{\lambda\}, a)) = q_{F_0}$ $\psi_0(q_{22}, (\{\lambda\}, a) = 0$ za $a \in$M \ \{195, 199\}, tj. ako se automati A_0,

K_0 ne susretnu,

$\psi_{k0}(q_{k0}, (\{q_{24}\}, a)) = 0$, $a \in$A,
$\varphi_0(q_{24}, (\{q_{k0}\}, a)) = q_{25}$ $\psi_0(q_{24}, (\{q_{k0}\}, a)) = e$ za $a \in$\{194, 195, 198, 199\}$\subset$M,
$\varphi_0(q_{24}, (\{\lambda\}, a)) = q_{F_0}$ $\psi_0(q_{24}, (\{\lambda\}, a)) = 0$ za $a \in$\{194, 195, 198, 199\}, tj. ako se

automati A_0, K_0 ne susretnu.

$\square$

4. Složenost i implementacija

Ovdje ćemo dati vremensku i memorijsku složenost automata, čija je konstrukcija opisana u prethodnoj glavi (kao i u Dodatku I i Dodatku II).

Označimo sa $T(A_q; L_v, n)$ vrijeme obilaska automatom A_q lavirinta L_v, gdje je $n = \|V(L)\|$ broj čvorova lavirinta L_v i $\|Q(A_q)\|$ broj stanja automata A_q. Tada važi sljedeća lema

Lema 3. Ako su A_i, $i \in \{0, 1, ..., 9\}$ automati konstruisani u **Teoremi 3** i **Teoremi 5**, tada važi:

a) $n + 4 \leq T(A_1; L_{DN}, n) \leq 4n - 11$, $n \geq 5$, $\|Q(A_1)\| = 14$.

b) $n + 4 \leq T(A_2; L_{DN}, n) \leq \begin{cases} 17, & n = 11, \\ 5n - 37, & n \geq 12. \end{cases}$, $n \geq 11$, $\|Q(A_2)\| = 37$.

c) $n + 8 \leq T(A_3; L_{DN}, n) \leq \begin{cases} 24, & n = 14, \\ 5n - 45, & n \geq 15. \end{cases}$, $n \geq 14$, $\|Q(A_3)\| = 53$.

d) $n + 5 \leq T(A_4; L_{ND}, n) \leq \begin{cases} 15, & n = 10, \\ \dfrac{5}{2}(n - 7) + 6, & n = 4k + 7, \\ \dfrac{5}{2}n - 12, & n = 4k + 8, \\ \dfrac{5}{2}(n - 1) - 10, & n = 4k + 9, \\ \dfrac{5}{2}n - 13, & n = 4k + 10. \end{cases}$, $k \geq 1$; $\|Q(A_4)\| = 33$.

e) $n + 10 \leq T(A_5; L_{DN}, n) \leq \begin{cases} 29, & n = 17, \\ 5n - 55, & n \geq 18 \end{cases}$, $n \geq 17$, $\|Q(A_5)\| = 51$.

f) $n + 13 \leq T(A_6; L_{LN}, n) \leq 4n - 26$, $n \geq 14$, $\|Q(A_6)\| = 83$.

g) $\quad n \leq T(A_7; L_{ND}, n) \leq \begin{cases} 6, & n = 6, \\ \dfrac{7}{5}(n-2), & n = 5k+2, \\ \dfrac{7}{5}(n-3), & n = 5k+3, \\ \dfrac{7}{5}(n-4)+1, & n = 5k+4, \\ \dfrac{7}{5}n-3, & n = 5k+5, \\ \dfrac{7}{5}(n-6)+5, & n = 5k+6. \end{cases}, \quad k \geq 1; \quad \|Q(A_7)\| = 12.$

h) $\quad \begin{rcases} n = 2k+11, & \dfrac{3}{2}(n-11)+29, \\ n = 2k+12, & \dfrac{3}{2}(n-12)+31, \end{rcases} \leq T(A_8; L_{ND}, n) \leq \begin{cases} \dfrac{9}{2}(n-12)+15, & n = 2k+12, \\ \dfrac{9}{2}(n-13)+19, & n = 2k+13, \end{cases}$

$k \geq 5, \ \|Q(A_8)\| = 91.$

i) $\quad n + 11 \leq T(A_9; L_{DN}, n) \leq \begin{cases} 25, & n = 14, \\ \dfrac{7}{2}(n-9)+8, & n = 2k+9, \\ \dfrac{7}{2}(n-10)+9, & n = 2k+10. \end{cases} \quad k \geq 3; \ \|Q(A_9)\| = 81.$

j) $\quad \begin{rcases} n = 2k+2, & \dfrac{3}{2}(n-2)+7, \\ n = 2k+3, & \dfrac{3}{2}(n-3)+9, \end{rcases} \leq T(A_0; L_{ND}, n) \leq \begin{cases} 16, & n = 8, \\ 20, & n = 9, \\ 4n-18, & n = 2k+4, \\ 4n-20, & n = 2k+5. \end{cases} \quad k \geq 3;$

$\|Q(A_0)\| = 42.$

Dokaz: Dokaz slijedi neposredno iz načina obilaska lavirinta $L_v \in C_i$ automatom A_i i činjenice da za dato n, uvijek možemo konstruisati lavirint $L \in C_i$, takav da $V(L) = n$ (za koje n je to moguće dato je u formulaciji **Leme 3**), a da vrijeme obilaska bude najmanje, odnosno najveće, $i \in \{0, 1, ..., 9\}$.

$\square$

Javila se potreba za programskom implementacijom, koja bi simulirala rad automata iz **Teoreme 3**, odnosno kolektiva automata iz **Teoreme 5**. Simulacija je realizovana na sistemu programiranja Borland C++ Builder-u.

Programska realizacija koja simulira rad automata A_i, slijedi iz samog opisa tog automata, $i \in \{1, 2, 3, 5, 7\}$.

Međutim, kako obilazak kolektiva automata (A_i, K_i) predstavlja parelelan rad automata A_i i automata kamena K_i, to je izvršena programska realizacija koja simulira rad automata A_i uz programsku pomoć, promjenljiva u programu pamti tačku na kojoj je "postavljen" automat kamen K_i, $i \in \{0, 4, 6, 8, 9\}$.

Unos podataka je grafički. Pri izvršavanju programa, na ekranu se pojavi iscrtana mreža, a zatim se mišem boje (u plavu boju) kvadratići te mreže i na ovaj način se vrši unos podataka. U okviru ove Forme nalazi se i meni koji se sastoji od šest dugmadi: **Prepoznaj, Obnovi, Brisi, Snimi, Ucitaj** i **Izlaz**.

Pritiskom na **Prepoznaj** vrši se prepoznavanje unesene figure. Kako su klase C_i, $i = 0, 1, ..., 9$, disjunktne, to se pri ovom izvršavanju pozivaju podprogrami koji simuliraju rad automata A_j, $j \in \{1, 2, 3, 5, 7\}$, odnosno kolektiva (A_k, K_k), $k \in \{0, 4, 6, 8, 9\}$. Kao rezultat dobija se jedan od odgovora "Cifra i", $i = 0, 1, ...,9$ ili "Ne prepoznajem". Rečeno je da se pri unosu podataka polja mreže boje u plavu boju. Pri ovom izvršavanju neka polja (ili sva) se boje u žuto, što znači da su ta polja bila "posjećena" od bar jednog automata A_i, $i = 0, 1, ..., 9$. Na ovaj način se prati obilazak unesene figure tj. rada pojedinih automata.

Pritiskom na **Obnovi** žuta polja se boje u plavo.

Pritiskom na **Briši** brišu se uneseni podaci tj. mreža postaje prazna.

Pritiskom na **Snimi** omogućeno je da se sačuva uneseni podatak.

Unesenom podatku se pristupa pritiskom na **Ucitaj**.

Pritiskom na **Izlaz** završava se sa izvršavanje programa.

Data mreža je tipa N × N. Podrazumjevana vrijednost za N je 20. Ova vrijednost se moze promjeniti ako u **Opcije** (takođe dio menija Forme gdje se nalaze sve navedene opcije i opcija **Izmjena N**) izaberete **Izmjena N**.

Sljedeće slike prikazuju rad ovog programa.
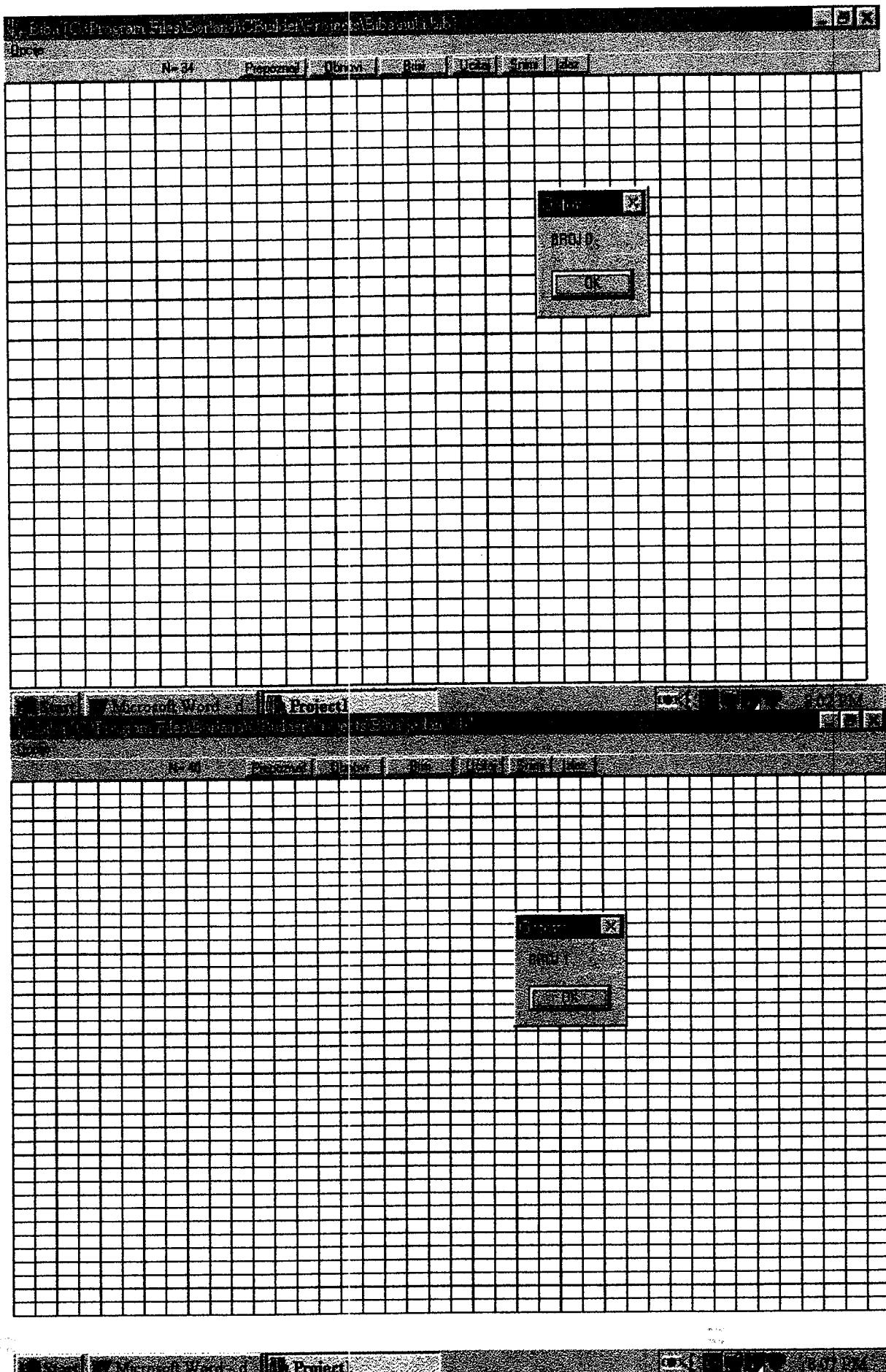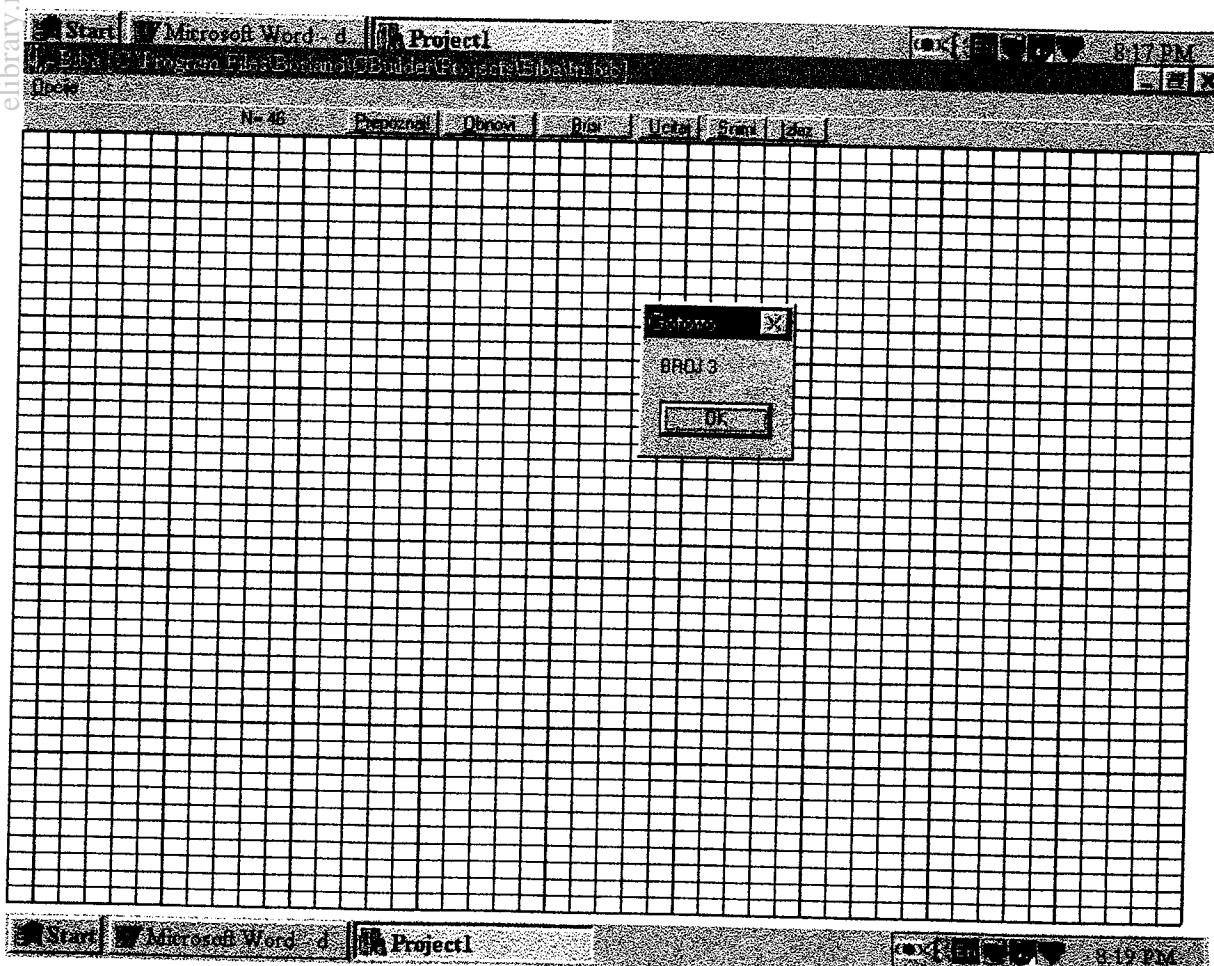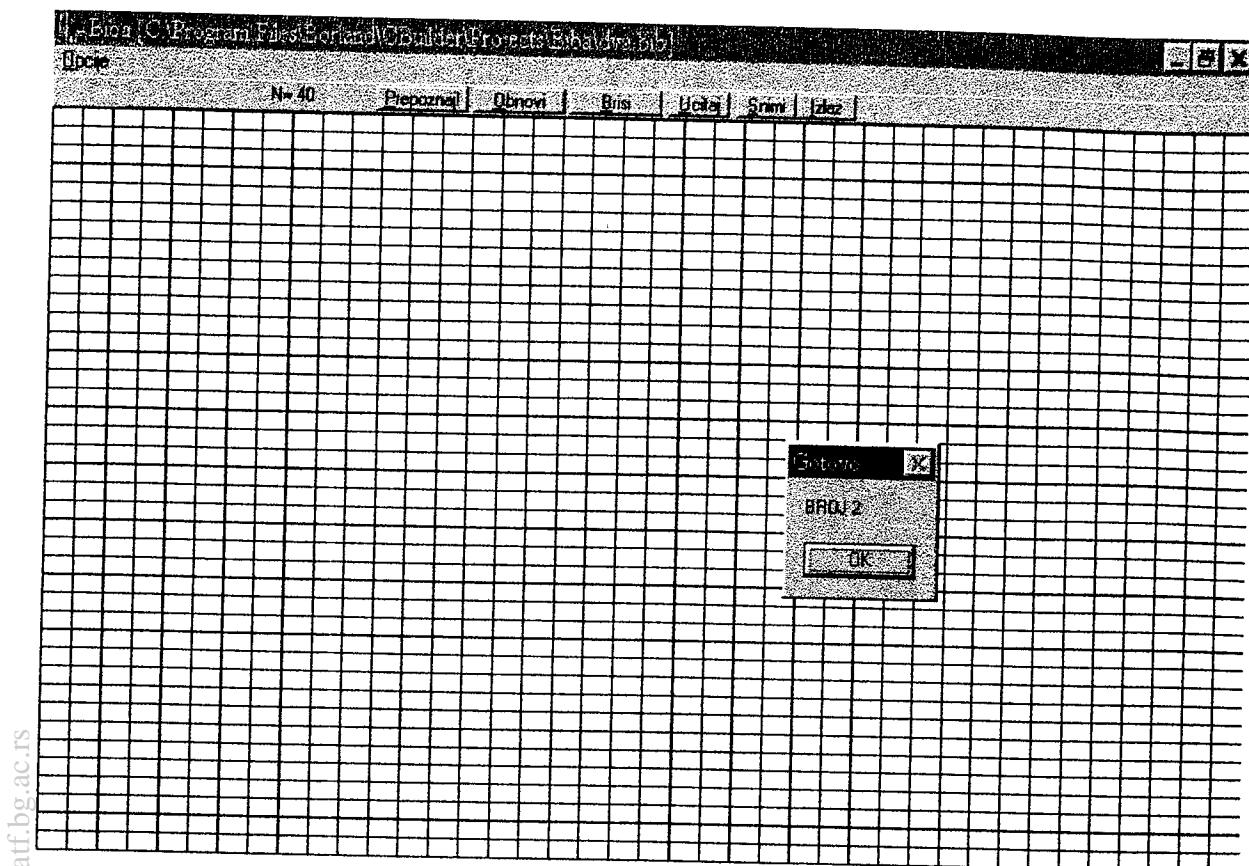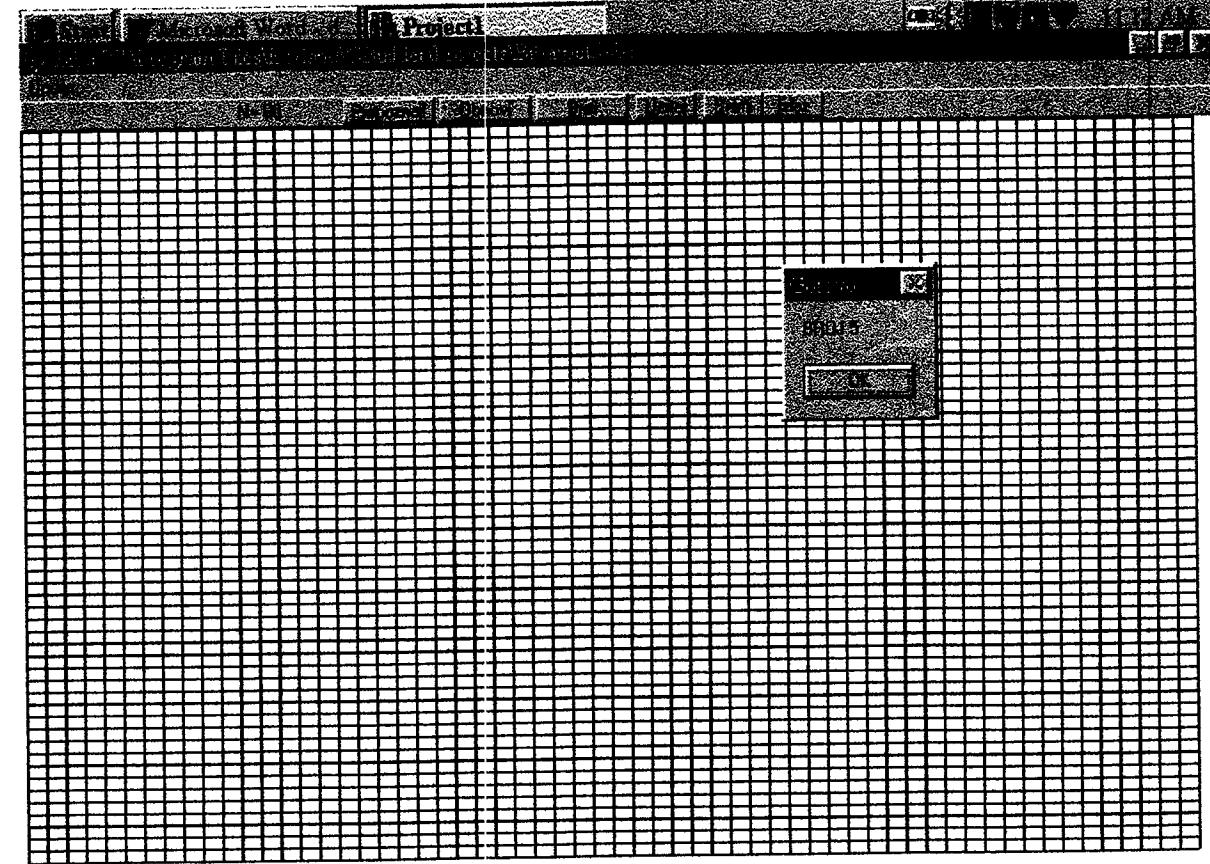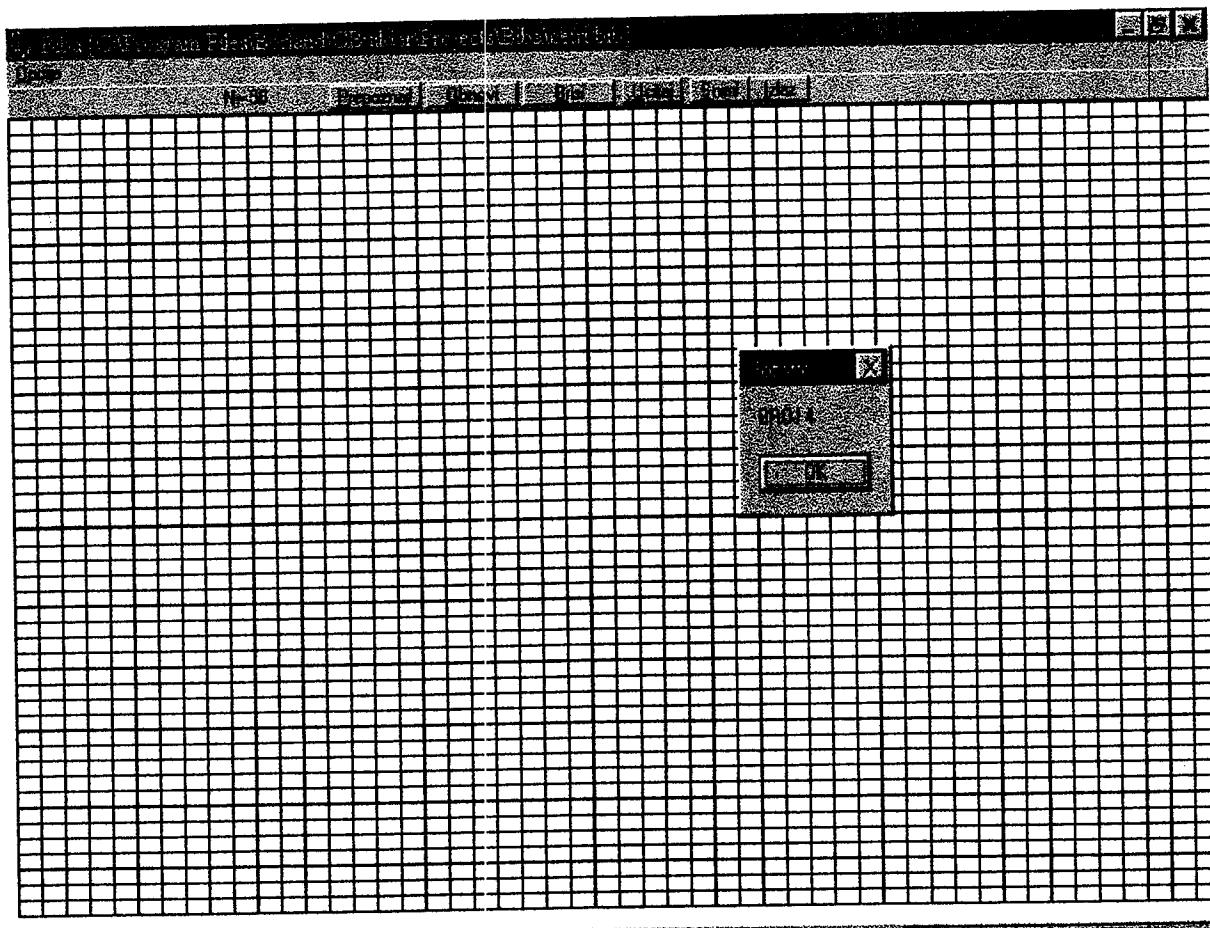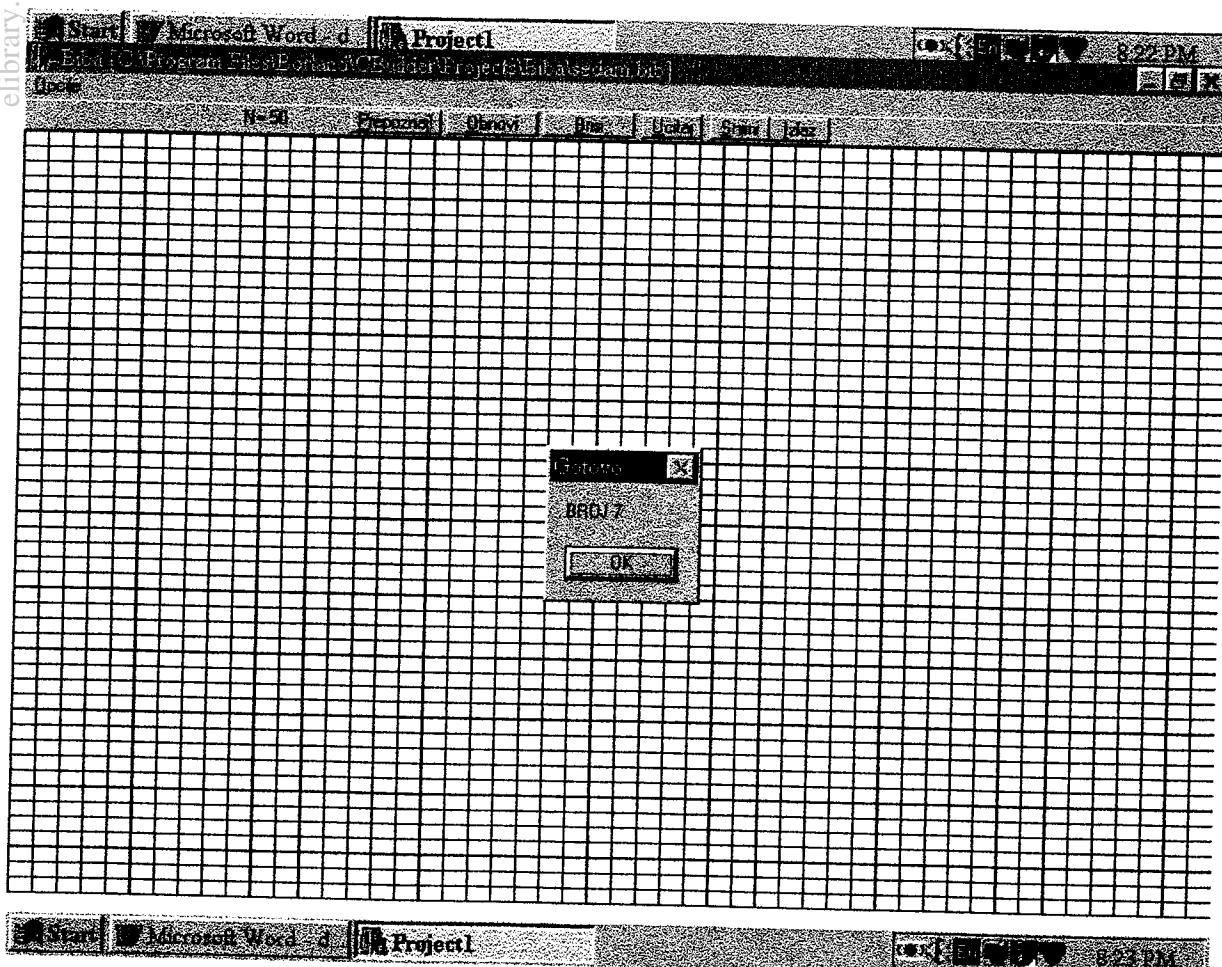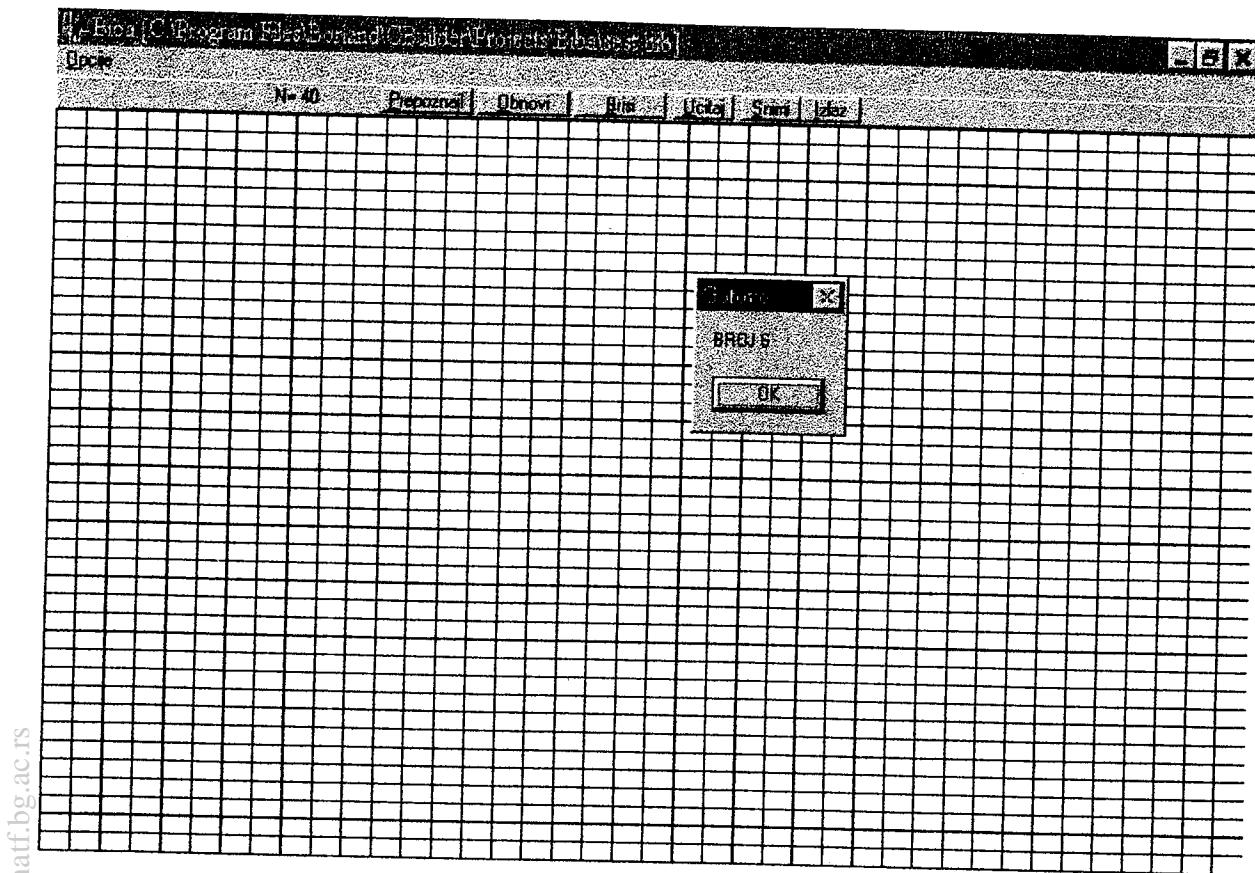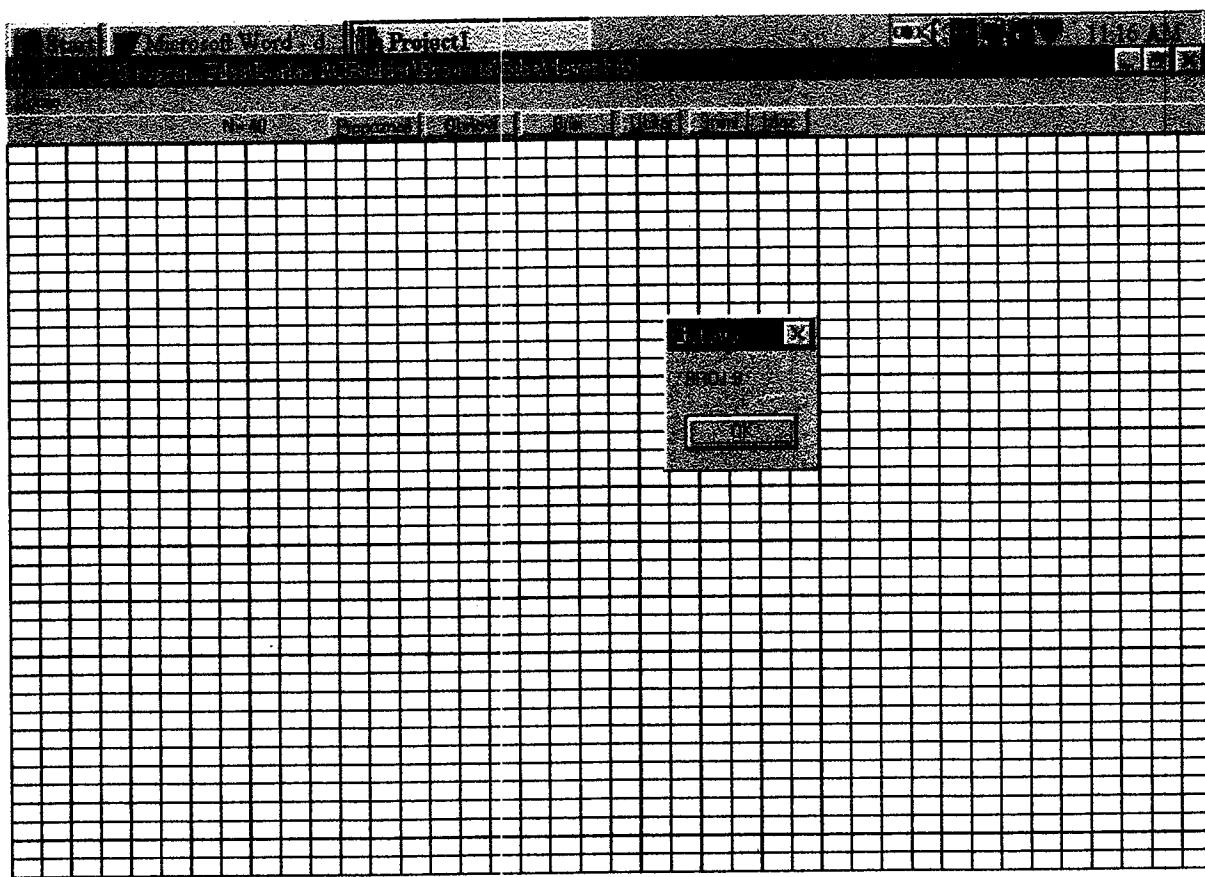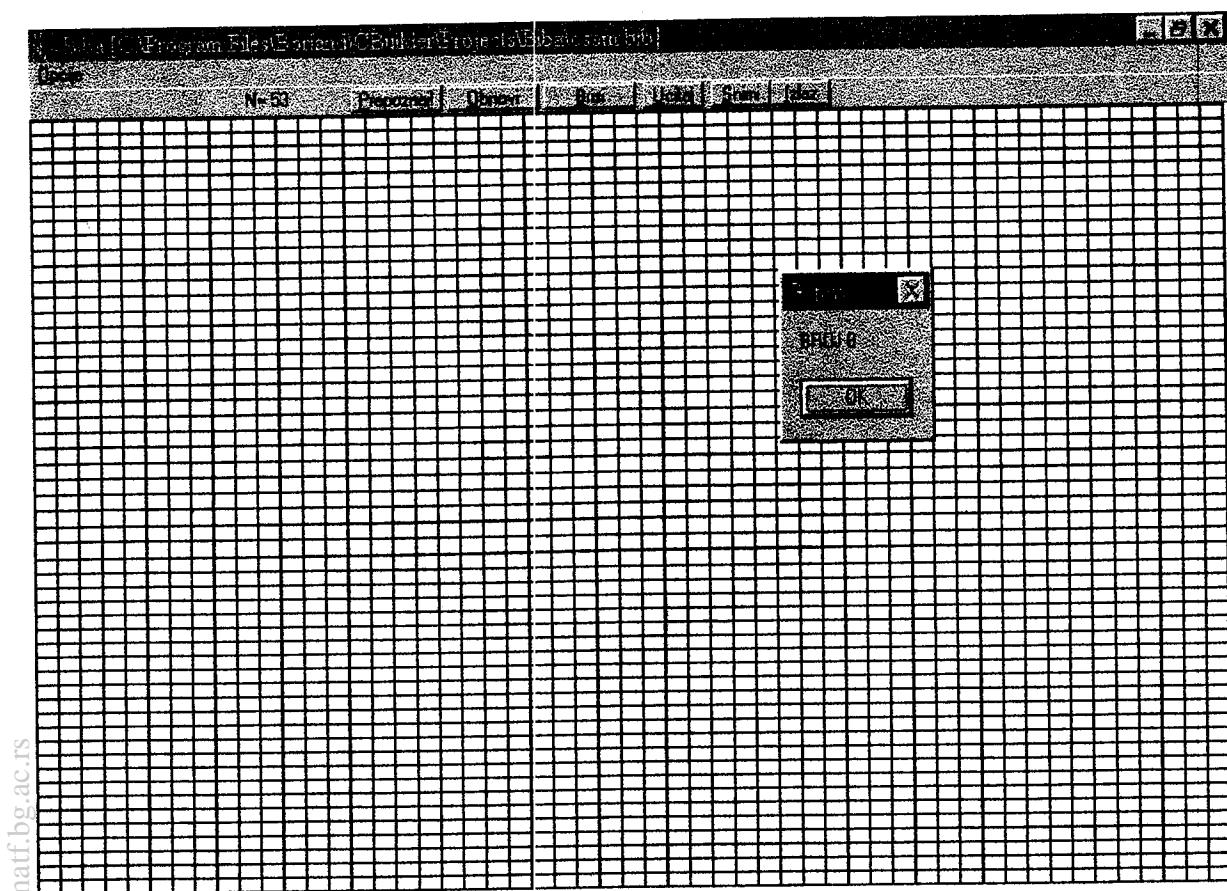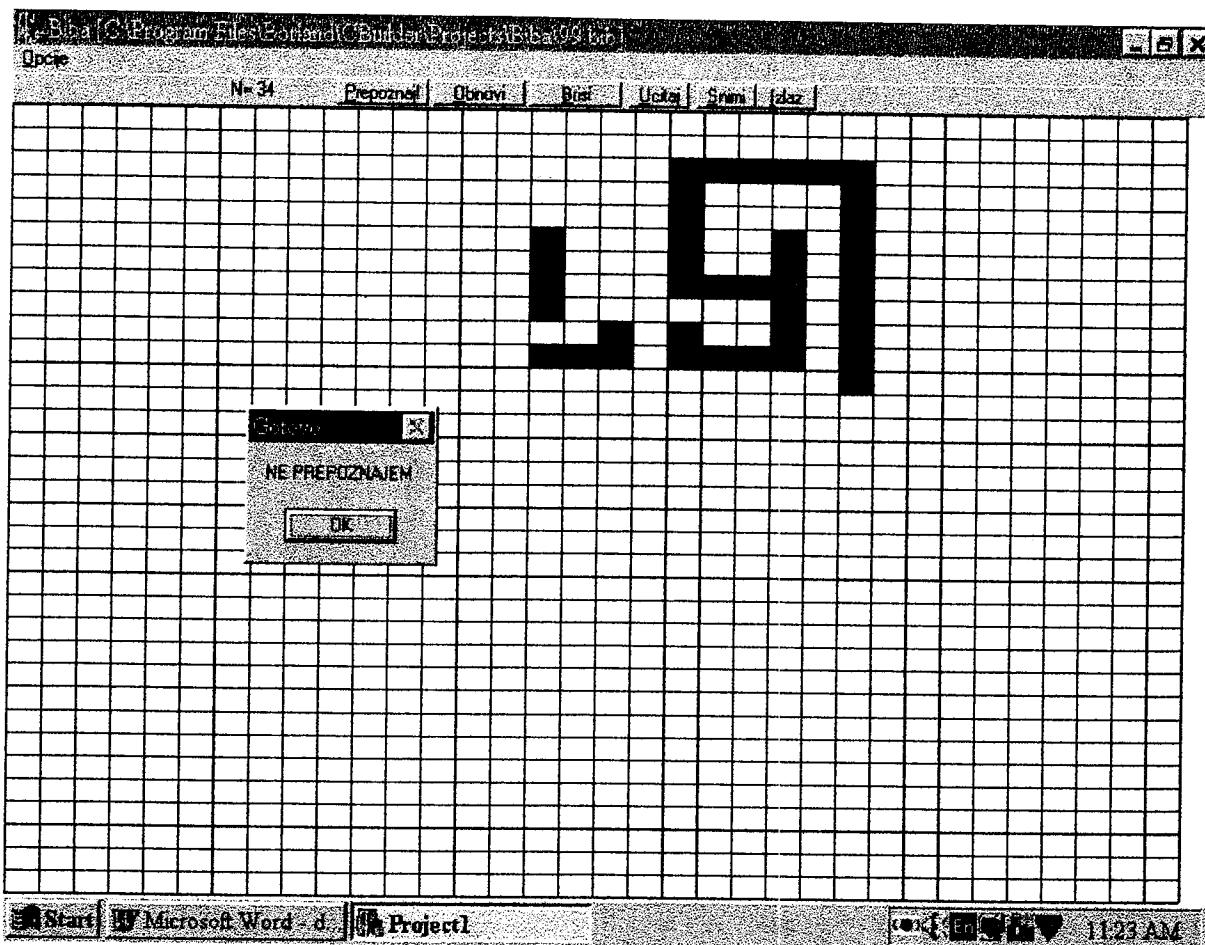
Dodatak I

Automat $A_1 = (A, Q_1, B, \varphi_1, \psi_1, q_1, Q_F)$ je definisan na sljedeći način:
$Q_1 = \{q_i \mid i \in \{1, ..., 12\}\} \cup Q_F$

$\varphi_1(q_1, a) = q_2 \quad \psi_1(q_1, a) = w$ za $a = 208$,
$\varphi_1(q_1, a) = q_2 \quad \psi_1(q_1, a) = n$ za $a \in \{16, 144\}$,
$\varphi_1(q_1, a) = q_{F_0} \quad \psi_1(q_1, a) = 0$ inače,

$\varphi_1(q_2, a) = q_2 \quad \psi_1(q_2, a) = w$ za $a \in \{214, 248, 255\}$,
$\varphi_1(q_2, a) = q_5 \quad \psi_1(q_2, a) = w$ za $a \in \{88, 72, 216\}$,
$\varphi_1(q_2, a) = q_3 \quad \psi_1(q_2, a) = n$ za $a \in \{22, 31\}$,
$\varphi_1(q_2, a) = q_4 \quad \psi_1(q_2, a) = e$ za $a \in \{150, 159\}$,
$\varphi_1(q_2, a) = q_2 \quad \psi_1(q_2, a) = n$ za $a \in \{24, 152\}$,
$\varphi_1(q_2, a) = q_{F_0} \quad \psi_1(q_2, a) = 0$ inače,

$\varphi_1(q_3, a) = q_3 \quad \psi_1(q_3, a) = e$ za $a \in \{31, 255\}$,
$\varphi_1(q_3, a) = q_2 \quad \psi_1(q_3, a) = n$ za $a = 248$,
$\varphi_1(q_3, a) = q_2 \quad \psi_1(q_3, a) = e$ za $a = 159$,
$\varphi_1(q_3, a) = q_{F_0} \quad \psi_1(q_3, a) = 0$ inače,

$\varphi_1(q_4, a) = q_4 \quad \psi_1(q_4, a) = e$ za $a \in \{214, 255\}$,
$\varphi_1(q_4, a) = q_5 \quad \psi_1(q_4, a) = n$ za $a \in \{208, 248\}$,
$\varphi_1(q_4, a) = q_{F_0} \quad \psi_1(q_4, a) = 0$ inače,

$\varphi_1(q_5, a) = q_5 \quad \psi_1(q_5, a) = w$ za $a \in \{66, 98, 246, 118, 214, 86, 70, 102, 67, 99, 215, 87, 119, 247, 71, 103, 104, 120, 248, 111, 79, 255, 223, 127, 95, 107, 75\}$,
$\varphi_1(q_5, a) = q_5 \quad \psi_1(q_5, a) = s$ za $a \in \{10, 14, 42, 46, 62, 106, 110, 254, 126, 30\}$,
$\varphi_1(q_5, a) = q_{F_0} \quad \psi_1(q_5, a) = 0$ inače,

$\varphi_1(q_6, a) = q_6 \quad \psi_1(q_6, a) = w$ za $a \in \{248, 240, 255, 127, 254, 126, 66, 98, 214, 86, 246, 252, 244, 212, 124, 116, 84, 111, 110, 102, 70, 120, 112, 80, 106, 107\}$,
$\varphi_1(q_6, a) = q_6 \quad \psi_1(q_6, a) = s$ za $a \in \{30, 62, 10, 42, 28, 60, 46, 14, 24, 56\}$,
$\varphi_1(q_6, a) = q_7 \quad \psi_1(q_6, a) = e$ za $a \in \{63, 31, 43, 11, 47, 15\}$,
$\varphi_1(q_6, a) = q_8 \quad \psi_1(q_6, a) = e$ za $a \in \{2, 6, 22\}$,
$\varphi_1(q_6, a) = q_8 \quad \psi_1(q_6, a) = n$ za $a \in \{16, 20\}$,
$\varphi_1(q_6, a) = q_{F_0} \quad \psi_1(q_6, a) = 0$ inače,

$\varphi_1(q_7, a) = q_6 \quad \psi_1(q_7, a) = s$ za $a \in \{106, 110, 120, 124, 126, 248, 252, 254\}$,
$\varphi_1(q_7, a) = q_7 \quad \psi_1(q_7, a) = e$ za $a \in \{b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 1\}$,
$\varphi_1(q_7, a) = q_{F_0} \quad \psi_1(q_7, a) = 0$ inače,

$\varphi_1(q_8, a) = q_9 \quad \psi_1(q_8, a) = w$ za $a \in \{67, 99, 215, 87, 119, 247, 71, 103\}$,
$\varphi_1(q_8, a) = q_8 \quad \psi_1(q_8, a) = e$ za $a \in \{b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 1, a_0 = 0\}$,
$\varphi_1(q_8, a) = q_8 \quad \psi_1(q_8, a) = n$ za $a \in \{b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 0, a_4 = 1\}$,
$\varphi_1(q_8, a) = q_{F_0} \quad \psi_1(q_8, a) = 0$ inače,

$\varphi_1(q_9, a) = q_8 \quad \psi_1(q_9, a) = w$ za $a \in \{86, 102, 70, 66, 98, 246, 118, 214\}$,
$\varphi_1(q_9, a) = q_{11} \quad \psi_1(q_9, a) = e$ za $a \in \{62, 30, 42, 10, 46, 14\}$,
$\varphi_1(q_9, a) = q_{10} \quad \psi_1(q_9, a) = w$ za $a \in \{106, 110, 254, 126\}$,
$\varphi_1(q_9, a) = q_{F_0} \quad \psi_1(q_9, a) = 0$ inače,

$\varphi_1(q_{10}, a) = q_{10} \quad \psi_1(q_{10}, a) = w$ za $a \in \{107, 111, 127, 255\}$,
$\varphi_1(q_{10}, a) = q_{11} \quad \psi_1(q_{10}, a) = e$ za $a \in \{11, 43, 63, 31, 47, 15\}$,
$\varphi_1(q_{10}, a) = q_{F_0} \quad \psi_1(q_{10}, a) = 0$ inače,

$\varphi_1(q_{11}, a) = q_{12} \quad \psi_1(q_{11}, a) = n$ za $a \in \{216, 88, 120, 248\}$,
$\varphi_1(q_{11}, a) = q_{11} \quad \psi_1(q_{11}, a) = e$ za $a \in \{b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 1\}$,
$\varphi_1(q_{11}, a) = q_{F_1} \quad \psi_1(q_{11}, a) = 0$ za $a \in \{72, 104\}$,
$\varphi_1(q_{11}, a) = q_{F_0} \quad \psi_1(q_{11}, a) = 0$ inače,

$\varphi_1(q_{12}, a) = q_{12} \quad \psi_1(q_{12}, a) = w$ za $a \in \{107, 111, 120, 104, 127, 248, 255\}$,
$\varphi_1(q_{12}, a) = q_{11} \quad \psi_1(q_{12}, a) = e$ za $a \in \{11, 15, 31, 43, 47, 63\}$,

$\varphi_1(q_{12}, a) = q_{F_1}$ $\psi_1(q_{12}, a) = 0$ za $a = 40$,

$\varphi_1(q_{12}, a) = q_{F_0}$ $\psi_1(q_{12}, a) = 0$ inače,

Automat $A_3 = (A, Q_3, B, \varphi_3, \psi_3, q_1, Q_F)$ je definisan na sljedeći način:
$Q_3 = \{q_i \mid i \in \{1, 2, ..., 51\}\} \cup Q_F$

$\varphi_3(q_1, a) = q_2$ $\psi_3(q_1, a) = w$ za $a \in \{208, 240, 80, 224, 112, 96, 192\}$,
$\varphi_3(q_1, a) = q_{F_0}$ $\psi_3(q_1, a) = 0$ inače,

$\varphi_3(q_2, a) = q_7$ $\psi_3(q_2, a) = n$ za $a = 148$,
$\varphi_3(q_2, a) = q_4$ $\psi_3(q_2, a) = e$ za $a \in \{22, 18, 150, 146\}$,
$\varphi_3(q_2, a) = q_2$ $\psi_3(q_2, a) = s$ za $a \in \{b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_3 = 1,\ a_0 = 0\}$,
$\varphi_3(q_2, a) = q_2$ $\psi_3(q_2, a) = w$ za $a \in \{b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_3 = 0,\ a_6 = 1\}$,
$\varphi_3(q_2, a) = q_3$ $\psi_3(q_2, a) = s$ za $a \in \{b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_1 = 0,\ a_0 = 1\}$,
$\varphi_3(q_2, a) = q_{F_0}$ $\psi_3(q_2, a) = 0$ inače,

$\varphi_3(q_3, a) = q_3$ $\psi_3(q_3, a) = e$ za $a \in \{b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_1 = 1,\ a_2 = 0\}$,
$\varphi_3(q_3, a) = q_3$ $\psi_3(q_3, a) = s$ za $a \in \{b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_1 = 0,\ a_3 = 1\}$,
$\varphi_3(q_3, a) = q_2$ $\psi_3(q_3, a) = w$ za $a \in \{b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_3 = 0,\ a_6 = 1,\ a_1 = 0\}$,
$\varphi_3(q_3, a) = q_{F_0}$ $\psi_3(q_3, a) = 0$ inače,

$\varphi_3(q_4, a) = q_5$ $\psi_3(q_4, a) = w$ za $a \in \{208, 212\}$,
$\varphi_3(q_4, a) = q_{12}$ $\psi_3(q_4, a) = w$ za $a \in \{80, 84\}$,
$\varphi_3(q_4, a) = q_4$ $\psi_3(q_4, a) = e$ za $a \in \{b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_0 = 0,\ a_1 = 1\}$,
$\varphi_3(q_4, a) = q_{F_0}$ $\psi_3(q_4, a) = 0$ inače,

$\varphi_3(q_5, a) = q_5$ $\psi_3(q_5, a) = w$ za $a \in \{255, 223, 214, 215, \}$,
$\varphi_3(q_5, a) = q_6$ $\psi_3(q_5, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_3(q_5, a) = q_{12}$ $\psi_3(q_5, a) = w$ za $a \in \{127, 95, 86, 87\}$,
$\varphi_3(q_5, a) = q_{F_0}$ $\psi_3(q_5, a) = 0$ inače,

$\varphi_3(q_6, a) = q_7$ $\psi_3(q_6, a) = n$ za $a \in \{208, 212, 240, 244, 248, 252\}$,
$\varphi_3(q_6, a) = q_6$ $\psi_3(q_6, a) = e$ za $a \in \{b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_1 = 1\}$,
$\varphi_3(q_6, a) = q_{F_0}$ $\psi_3(q_6, a) = 0$ inače,

$\varphi_3(q_7, a) = q_8$ $\psi_3(q_7, a) = w$ za $a \in \{208, 212, 240, 244\}$,
$\varphi_3(q_7, a) = q_5$ $\psi_3(q_7, a) = w$ za $a \in \{248, 252\}$,
$\varphi_3(q_7, a) = q_9$ $\psi_3(q_7, a) = e$ za $a \in \{74, 78, 202, 94, 206, 218, 106, 110, 234, 126, 238, 250, 210, 242\}$,
$\varphi_3(q_7, a) = q_7$ $\psi_3(q_7, a) = e$ za $a \in \{214, 246, 222, 254\}$,
$\varphi_3(q_7, a) = q_{12}$ $\psi_3(q_7, a) = w$ za $a \in \{120, 124\}$,
$\varphi_3(q_7, a) = q_{F_0}$ $\psi_3(q_7, a) = 0$ inače,

$\varphi_3(q_8, a) = q_8$ $\psi_3(q_8, a) = w$ za $a \in \{214, 246\}$,
$\varphi_3(q_8, a) = q_5$ $\psi_3(q_8, a) = w$ za $a \in \{222, 254\}$,
$\varphi_3(q_8, a) = q_{F_0}$ $\psi_3(q_8, a) = 0$ inače,

$\varphi_3(q_9, a) = q_9$ $\psi_3(q_9, a) = e$ za $a \in \{98, 102, 118, 246, 226, 230, 66, 70, 86, 214, 194, 198\}$,
$\varphi_3(q_9, a) = q_{10}$ $\psi_3(q_9, a) = w$ za $a \in \{112, 116, 244, 240, 80, 84, 208, 212\}$,
$\varphi_3(q_9, a) = q_{F_0}$ $\psi_3(q_9, a) = 0$ inače,

$\varphi_3(q_{10}, a) = q_{10}$ $\psi_3(q_{10}, a) = w$ za $a \in \{98, 102, 118, 246, 66, 70, 86, 214, 242, 210, 226, 230, 194, 198, 146, 230\}$,
$\varphi_3(q_{10}, a) = q_{11}$ $\psi_3(q_{10}, a) = w$ za $a \in \{74, 78, 94, 218, 106, 110, 126, 250, 254, 222, 202, 206, 234, 238\}$,
$\varphi_3(q_{10}, a) = q_{F_0}$ $\psi_3(q_{10}, a) = 0$ inače,

$\varphi_3(q_{11}, a) = q_{11} \psi_3(q_{11}, a) = w$ za $a \in \{255, 223, 215, 251, 219, 211, 79, 71, 111, 107, 75, 67, 214, 66, 210, 203, 207, 194, 195, 235, 239, 198, 199\}$,

$\varphi_3(q_{11}, a) = q_{13} \psi_3(q_{11}, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_3(q_{11}, a) = q_{14} \psi_3(q_{11}, a) = n$ za $a \in \{18, 19, 27, 146, 147, 155\}$,

$\varphi_3(q_{11}, a) = q_{F_0} \quad \psi_3(q_{11}, a) = 0$ inače,

$\varphi_3(q_{12}, a) = q_{12} \psi_3(q_{12}, a) = w$ za $a \in \{211, 67, 210, 66, 255, 223, 70, 71, 107, 75, 215, 111, 79, 219, 251, 214, 194, 195, 198, 199, 203, 207, 235, 239\}$,

$\varphi_3(q_{12}, a) = q_{13} \psi_3(q_{12}, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_3(q_{12}, a) = q_{14} \psi_3(q_{12}, a) = n$ za $a \in \{18, 19, 27, 146, 147, 155\}$,

$\varphi_3(q_{12}, a) = q_{F_0} \quad \psi_3(q_{12}, a) = 0$ inače,

$\varphi_3(q_{13}, a) = q_{14} \psi_3(q_{13}, a) = n$ za $a \in \{210, 211, 219, 218, 250, 251, 242\}$,

$\varphi_3(q_{13}, a) = q_{13} \psi_3(q_{13}, a) = e$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 1\}$,

$\varphi_3(q_{13}, a) = q_{F_0} \quad \psi_3(q_{13}, a) = 0$ inače,

$\varphi_3(q_{14}, a) = q_{14} \psi_3(q_{14}, a) = w$ za $a \in \{248, 232, 104, 105, 249, 233, 219, 217, 201, 73, 67, 195, 211, 214, 66, 194, 210, 216, 200, 72, 107, 235, 75, 203, 215, 255, 223, 251\}$,

$\varphi_3(q_{14}, a) = q_{14} \psi_3(q_{14}, a) = n$ za $a \in \{18, 19, 24, 25, 27, 146, 147, 152, 153, 155\}$,

$\varphi_3(q_{14}, a) = q_{15} \psi_3(q_{14}, a) = e$ za $a \in \{22, 23, 31, 151, 150, 159\}$,

$\varphi_3(q_{14}, a) = q_{16} \psi_3(q_{14}, a) = e$ za $a \in \{2, 3, 11\}$,

$\varphi_3(q_{14}, a) = q_{16} \psi_3(q_{14}, a) = s$ za $a \in \{8, 9\}$,

$\varphi_3(q_{14}, a) = q_{F_0} \quad \psi_3(q_{14}, a) = 0$ inače,

$\varphi_3(q_{15}, a) = q_{14} \psi_3(q_{15}, a) = n$ za $a \in \{210, 211, 216, 217, 219, 248, 249, 251\}$,

$\varphi_3(q_{15}, a) = q_{15} \psi_3(q_{15}, a) = e$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 1\}$,

$\varphi_3(q_{15}, a) = q_{F_0} \quad \psi_3(q_{15}, a) = 0$ inače,

$\varphi_3(q_{16}, a) = q_{17} \psi_3(q_{16}, a) = n$ za $a \in \{80, 84, 86, 112, 116, 118, 120, 124, 126, 127\}$,

$\varphi_3(q_{16}, a) = q_{16} \psi_3(q_{16}, a) = s$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 0\}$,

$\varphi_3(q_{16}, a) = q_{16} \psi_3(q_{16}, a) = e$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 1\}$,

$\varphi_3(q_{16}, a) = q_{F_0} \quad \psi_3(q_{16}, a) = 0$ inače,

$\varphi_3(q_{17}, a) = q_{17} \psi_3(q_8, a) = e$ za $a \in \{43, 47, 107, 111, 127, 255, 254, 126, 246, 214, 63, 31, 62, 46, 42, 11, 15, 30, 14, 10, 106, 110, 66, 70, 98, 102, 118, 86\}$,

$\varphi_3(q_{17}, a) = q_{17} \psi_3(q_8, a) = n$ za $a \in \{56, 60, 184, 24, 28, 152, 120, 124, 112, 116, 80, 84\}$,

$\varphi_3(q_{17}, a) = q_{19} \psi_3(q_8, a) = e$ za $a \in \{26, 27, 58, 59, 154, 155, 158, 159, 186, 187, 190, 191, 210, 242, 250, 251\}$,

$\varphi_3(q_{17}, a) = q_{18} \psi_3(q_{17}, a) = w$ za $a \in \{208, 212, 240, 244, 248, 252\}$,

$\varphi_3(q_{17}, a) = q_{21} \psi_3(q_{17}, a) = w$ za $a \in \{72, 200, 216\}$,

$\varphi_3(q_{17}, a) = q_{23} \psi_3(q_{17}, a) = w$ za $a \in \{88, 92, 220\}$,

$\varphi_3(q_{17}, a) = q_{F_0} \quad \psi_3(q_{17}, a) = 0$ inače,

$\varphi_3(q_{18}, a) = q_{17} \psi_3(q_{18}, a) = n$ za $a \in \{30, 31, 62, 63, 86, 118, 126, 127\}$,

$\varphi_3(q_{18}, a) = q_{18} \psi_3(q_{18}, a) = w$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_6 = 1\}$,

$\varphi_3(q_{18}, a) = q_{F_0} \quad \psi_3(q_{18}, a) = 0$ inače,

$\varphi_3(q_{19}, a) = q_{19} \psi_3(q_{19}, a) = e$ za $a \in \{234, 235, 250, 251, 254, 255, 242, 246, 106, 107, 210, 214\}$,

$\varphi_3(q_{19}, a) = q_{21} \psi_3(q_{19}, a) = n$ za $a \in \{240, 248, 249\}$,

$\varphi_3(q_{19}, a) = q_{20} \psi_3(q_{19}, a) = w$ za $a \in \{104, 105, 96, 208, 192, 224, 232, 233\}$,

$\varphi_3(q_{19}, a) = q_{F_0} \quad \psi_3(q_{19}, a) = 0$ inače,

$\varphi_3(q_{20}, a) = q_{21} \psi_3(q_{20}, a) = n$ za $a \in \{26, 27, 58, 59, 154, 155, 186, 187, 210, 242, 250, 251\}$,

$\varphi_3(q_{20}, a) = q_{20} \psi_3(q_{20}, a) = w$ za $a \in \{106, 107, 234, 235\}$,

$\varphi_3(q_{20}, a) = q_{F_0} \quad \psi_3(q_{20}, a) = 0$ inače,

$\varphi_3(q_{21}, a) = q_{21} \psi_3(q_{21}, a) = w$ za $a \in \{214, 66, 194, 210, 216, 200, 72, 107, 235, 75, 203, 215, 255, 223, 251, 219, 217, 201, 73, 67, 195, 211, 248, 232, 104, 249, 233, 105\}$,

$\varphi_3(q_{21}, a) = q_{21} \psi_3(q_{21}, a) = n$ za $a \in \{18, 19, 24, 25, 27, 146, 147, 152, 153, 155\}$,

$\varphi_3(q_{21}, a) = q_{23} \psi_3(q_{21}, a) = w$ za $a \in \{88, 89, 92, 93, 220, 221, 127, 86, 87, 120, 121, 95, 124, 125, 252, 253\}$,

$\varphi_3(q_{21}, a) = q_{22} \psi_3(q_{21}, a) = e$ za $a \in \{22, 23, 31, 63, 150, 151, 159\}$,

$\varphi_3(q_{21}, a) = q_{F_0}$ $\psi_3(q_{21}, a) = 0$ inače,

$\varphi_3(q_{22}, a) = q_{21}$ $\psi_3(q_{22}, a) = n$ za $a \in \{210, 211, 216, 217, 219, 248, 249, 251\}$,

$\varphi_3(q_{22}, a) = q_{22}$ $\psi_3(q_{22}, a) = e$ za $a \in \{\, b \in A|\ b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_1 = 1\}$,

$\varphi_3(q_{22}, a) = q_{F_0}$ $\psi_3(q_{22}, a) = 0$ inače,

$\varphi_3(q_{23}, a) = q_{14}$ $\psi_3(q_{14}, a) = w$ za $a \in \{70, 71, 75, 79, 86, 107, 111, 214, 87, 215, 223, 255, 127, 95, 66, 67\}$,

$\varphi_3(q_{23}, a) = q_{24}$ $\psi_3(q_{23}, a) = e$ za $a \in \{2, 3, 6, 7\}$,

$\varphi_3(q_{23}, a) = q_{25}$ $\psi_3(q_{23}, a) = n$ za $a \in \{22, 23\}$,

$\varphi_3(q_{23}, a) = q_{23}$ $\psi_3(q_{23}, a) = s$ za $a = 31$,

$\varphi_3(q_{23}, a) = q_{24}$ $\psi_3(q_{23}, a) = s$ za $a \in \{11, 15\}$,

$\varphi_3(q_{23}, a) = q_{F_0}$ $\psi_3(q_{23}, a) = 0$ inače,

$\varphi_3(q_{24}, a) = q_{28}$ $\psi_3(q_{24}, a) = n$ za $a \in \{86, 87, 88, 89, 92, 93, 95, 120, 121, 124, 125, 127\}$,

$\varphi_3(q_{24}, a) = q_{24}$ $\psi_3(q_{24}, a) = e$ za $a \in \{66, 67, 70, 71, 75, 79, 107, 111\}$,

$\varphi_3(q_{24}, a) = q_{24}$ $\psi_3(q_{24}, a) = s$ za $a = 31$,

$\varphi_3(q_{24}, a) = q_{27}$ $\psi_3(q_{24}, a) = n$ za $a \in \{22, 23\}$,

$\varphi_3(q_{24}, a) = q_{F_0}$ $\psi_3(q_{24}, a) = 0$ inače,

$\varphi_3(q_{25}, a) = q_{26}$ $\psi_3(q_{25}, a) = w$ za $a \in \{208, 212, 240, 244, 248, 249, 252, 251, 253\}$,

$\varphi_3(q_{25}, a) = q_{25}$ $\psi_3(q_{25}, a) = e$ za $a \in \{31, 214, 246, 254, 255\}$,

$\varphi_3(q_{25}, a) = q_{27}$ $\psi_3(q_{25}, a) = e$ za $a \in \{11, 15\}$,

$\varphi_3(q_{25}, a) = q_{F_0}$ $\psi_3(q_{25}, a) = 0$ inače,

$\varphi_3(q_{26}, a) = q_{26}$ $\psi_3(q_{26}, a) = w$ za $a \in \{214, 246, 254, 255\}$,

$\varphi_3(q_{26}, a) = q_{25}$ $\psi_3(q_{26}, a) = n$ za $a = 31$,

$\varphi_3(q_{26}, a) = q_{F_0}$ $\psi_3(q_{26}, a) = 0$ inače,

$\varphi_3(q_{27}, a) = q_{27}$ $\psi_3(q_{27}, a) = e$ za $a \in \{107, 111, 127, 214, 246, 254, 255, 11, 15\}$,

$\varphi_3(q_{27}, a) = q_{29}$ $\psi_3(q_{27}, a) = w$ za $a \in \{208, 212, 240, 244, 248, 249, 252, 253\}$,

$\varphi_3(q_{27}, a) = q_{28}$ $\psi_3(q_{27}, a) = n$ za $a \in \{120, 121, 124, 125\}$,

$\varphi_3(q_{27}, a) = q_{27}$ $\psi_3(q_{27}, a) = n$ za $a = 31$,

$\varphi_3(q_{27}, a) = q_{28}$ $\psi_3(q_{27}, a) = e$ za $a \in \{106, 110, 126\}$,

$\varphi_3(q_{27}, a) = q_{F_0}$ $\psi_3(q_{27}, a) = 0$ inače,

$\varphi_3(q_{28}, a) = q_{28}$ $\psi_3(q_{28}, a) = e$ za $a \in \{43, 47, 107, 111, 127, 255, 254, 126, 246, 214, 63, 31, 62, 46, 42, 11, 15, 30, 14, 10, 106, 110, 66, 70, 98, 102, 118, 86\}$,

$\varphi_3(q_{28}, a) = q_{28}$ $\psi_3(q_{28}, a) = n$ za $a \in \{56, 60, 184, 24, 28, 152, 120, 124, 112, 116, 80, 84\}$,

$\varphi_3(q_{28}, a) = q_{30}$ $\psi_3(q_{28}, a) = e$ za $a \in \{26, 27, 58, 59, 154, 155, 158, 159, 186, 187, 190, 191, 210, 242, 250, 251\}$,

$\varphi_3(q_{28}, a) = q_{29}$ $\psi_3(q_{28}, a) = w$ za $a \in \{208, 212, 240, 244, 248, 252\}$,

$\varphi_3(q_{28}, a) = q_{32}$ $\psi_3(q_{28}, a) = w$ za $a \in \{72, 200, 216\}$,

$\varphi_3(q_{28}, a) = q_{F_0}$ $\psi_3(q_{28}, a) = 0$ inače,

$\varphi_3(q_{29}, a) = q_{28}$ $\psi_3(q_{29}, a) = n$ za $a \in \{30, 31, 62, 63, 86, 118, 126, 127\}$,

$\varphi_3(q_{29}, a) = q_{29}$ $\psi_3(q_{29}, a) = w$ za $a \in \{\, b \in A|\ b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_6 = 1\}$,

$\varphi_3(q_{29}, a) = q_{F_0}$ $\psi_3(q_{29}, a) = 0$ inače,

$\varphi_3(q_{30}, a) = q_{30}$ $\psi_3(q_{30}, a) = e$ za $a \in \{234, 235, 250, 251, 254, 255, 242, 246, 106, 107, 210, 214\}$,

$\varphi_3(q_{30}, a) = q_{31}$ $\psi_3(q_{30}, a) = w$ za $a \in \{104, 105, 96, 208, 192, 224, 232, 233\}$,

$\varphi_3(q_{30}, a) = q_{32}$ $\psi_3(q_{30}, a) = n$ za $a \in \{240, 248, 249\}$,

$\varphi_3(q_{30}, a) = q_{F_0}$ $\psi_3(q_{30}, a) = 0$ inače,

$\varphi_3(q_{31}, a) = q_{32}$ $\psi_3(q_{31}, a) = n$ za $a \in \{26, 27, 58, 59, 154, 155, 186, 187, 210, 242, 250, 251\}$,

$\varphi_3(q_{31}, a) = q_{31}$ $\psi_3(q_{31}, a) = w$ za $a \in \{106, 107, 234, 235\}$,

$\varphi_3(q_{31}, a) = q_{F_0}$ $\psi_3(q_{31}, a) = 0$ inače,

$\varphi_3(q_{32}, a) = q_{32}$ $\psi_3(q_{32}, a) = w$ za $a \in \{214, 66, 194, 210, 216, 200, 72, 107, 235, 75, 203, 215, 255, 223, 251, 219, 217, 201, 73, 67, 195, 211, 248, 232, 104, 249, 233, 105\}$,

$\varphi_3(q_{32}, a) = q_{32}$ $\psi_3(q_{32}, a) = n$ za $a \in \{18, 19, 24, 25, 27, 146, 147, 152, 153, 155\}$,

$\varphi_3(q_{32}, a) = q_{34}$ $\psi_3(q_{32}, a) = w$ za $a \in \{99, 227, 95, 127, 83, 115, 242, 243, 87, 247, 119, 91, 123, 98, 226, 82, 114, 86, 118, 246\}$,

$\varphi_3(q_{32}, a) = q_{33}$ $\psi_3(q_{32}, a) = e$ za $a \in \{22, 23, 31, 63, 150, 151, 159\}$,

$\varphi_3(q_{32}, a) = q_{F_0}$ $\psi_3(q_{32}, a) = 0$ inače,

$\varphi_3(q_{33}, a) = q_{32}$ $\psi_3(q_{33}, a) = n$ za $a \in \{248, 249, 251, 210, 211, 216, 217, 219\}$,

$\varphi_3(q_{33}, a) = q_{33}$ $\psi_3(q_{33}, a) = e$ za $a \in \{$ $b \in A|$ $b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7$, $a_1 = 1\}$,
$\varphi_3(q_{33}, a) = q_{F_0}$ $\psi_3(q_{33}, a) = 0$ inače,

$\varphi_3(q_{34}, a) = q_{34}$ $\psi_3(q_{34}, a) = w$ za $a \in \{66, 67, 98, 75, 99, 107, 102, 70, 71, 103, 79, 111\}$,
$\varphi_3(q_{34}, a) = q_{35}$ $\psi_3(q_{34}, a) = s$ za $a \in \{106, 42, 10, 234, 110, 46, 14, 250, 122, 126, 254, 62, 30\}$,
$\varphi_3(q_{34}, a) = q_{F_0}$ $\psi_3(q_{34}, a) = 0$ inače,

$\varphi_3(q_{35}, a) = q_{35}$ $\psi_3(q_{35}, a) = w$ za $a \in \{66, 98, 255, 127, 254, 126, 214, 86, 246, 252, 244, 212, 124, 116, 84, 111, 110, 102, 70, 120, 112, 80, 107, 106\}$,
$\varphi_3(q_{35}, a) = q_{35}$ $\psi_3(q_{35}, a) = s$ za $a \in \{30, 62, 10, 42, 28, 60, 46, 14, 24, 56\}$,
$\varphi_3(q_{35}, a) = q_{36}$ $\psi_3(q_{35}, a) = e$ za $a \in \{11, 15, 43, 47, 31, 63\}$,
$\varphi_3(q_{35}, a) = q_{37}$ $\psi_3(q_{35}, a) = e$ za $a \in \{2, 6, 22\}$,
$\varphi_3(q_{35}, a) = q_{37}$ $\psi_3(q_{35}, a) = n$ za $a \in \{16, 20\}$,
$\varphi_3(q_{35}, a) = q_{F_0}$ $\psi_3(q_{35}, a) = 0$ inače,

$\varphi_3(q_{36}, a) = q_{35}$ $\psi_3(q_{36}, a) = s$ za $a \in \{106, 110, 120, 124, 126, 248, 252, 254\}$,
$\varphi_3(q_{36}, a) = q_{36}$ $\psi_3(q_{36}, a) = e$ za $a \in \{$ $b \in A|$ $b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7$, $a_1 = 1\}$,
$\varphi_3(q_{36}, a) = q_{F_0}$ $\psi_3(q_{36}, a) = 0$ inače,

$\varphi_3(q_{37}, a) = q_{38}$ $\psi_3(q_{37}, a) = e$ za $a \in \{215, 87, 71, 67, 83, 211, 195, 115, 243, 227, 247, 119, 103, 99\}$,
$\varphi_3(q_{37}, a) = q_{37}$ $\psi_3(q_{37}, a) = n$ za $a \in \{$ $b \in A|$ $b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7$, $a_1 = 0$, $a_4 = 1\}$,
$\varphi_3(q_{37}, a) = q_{37}$ $\psi_3(q_{37}, a) = e$ za $a \in \{$ $b \in A|$ $b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7$, $a_1 = 1$, $a_3 = 0\}$,
$\varphi_3(q_{37}, a) = q_{F_0}$ $\psi_3(q_{37}, a) = 0$ inače,

$\varphi_3(q_{38}, a) = q_{39}$ $\psi_3(q_{38}, a) = w$ za $a \in \{200, 201, 232, 233, 216, 217, 248, 249\}$,
$\varphi_3(q_{38}, a) = q_{44}$ $\psi_3(q_{38}, a) = w$ za $a \in \{104, 105, 72, 73\}$,
$\varphi_3(q_{38}, a) = q_{38}$ $\psi_3(q_{38}, a) = e$ za $a \in \{$ $b \in A|$ $b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7$, $a_1 = 1\}$,
$\varphi_3(q_{38}, a) = q_{38}$ $\psi_3(q_{38}, a) = 0$ inače,

$\varphi_3(q_{39}, a) = q_{39}$ $\psi_3(q_{39}, a) = w$ za $a \in \{210, 211, 242, 243, 219, 251, 214, 246, 255, 223, 247, 215\}$,

$\varphi_3(q_{39}, a) = q_{40}$ $\psi_3(q_{39}, a) = w$ za $a \in \{91, 95, 83, 115, 82, 87, 86, 119, 114, 118\}$,
$\varphi_3(q_{39}, a) = q_{46}$ $\psi_3(q_{39}, a) = e$ za $a \in \{30, 62\}$,
$\varphi_3(q_{39}, a) = q_{42}$ $\psi_3(q_{39}, a) = w$ za $a \in \{122, 126\}$,
$\varphi_3(q_{39}, a) = q_{41}$ $\psi_3(q_{39}, a) = w$ za $a \in \{123, 127\}$,
$\varphi_3(q_{39}, a) = q_{43}$ $\psi_3(q_{39}, a) = w$ za $a \in \{250, 254\}$,
$\varphi_3(q_{39}, a) = q_{F_0}$ $\psi_3(q_{39}, a) = 0$ inače,

$\varphi_3(q_{40}, a) = q_{40}$ $\psi_3(q_{40}, a) = w$ za $a \in \{66, 67, 70, 71, 98, 99, 102, 103\}$,
$\varphi_3(q_{40}, a) = q_{42}$ $\psi_3(q_{40}, a) = w$ za $a \in \{106, 110\}$,
$\varphi_3(q_{40}, a) = q_{46}$ $\psi_3(q_{40}, a) = e$ za $a \in \{10, 14, 42, 46\}$,
$\varphi_3(q_{40}, a) = q_{F_0}$ $\psi_3(q_{40}, a) = 0$ inače,

$\varphi_3(q_{41}, a) = q_{41}$ $\psi_3(q_{41}, a) = w$ za $a \in \{107, 111\}$,
$\varphi_3(q_{41}, a) = q_{40}$ $\psi_3(q_{41}, a) = w$ za $a \in \{75, 79\}$,
$\varphi_3(q_{41}, a) = q_{F_0}$ $\psi_3(q_{41}, a) = 0$ inače,

$\varphi_3(q_{42}, a) = q_{42}$ $\psi_3(q_{42}, a) = w$ za $a \in \{107, 111\}$,
$\varphi_3(q_{42}, a) = q_{46}$ $\psi_3(q_{42}, a) = e$ za $a \in \{11, 15, 43, 47\}$,
$\varphi_3(q_{42}, a) = q_{F_0}$ $\psi_3(q_{42}, a) = 0$ inače,

$\varphi_3(q_{43}, a) = q_{43}$ $\psi_3(q_{43}, a) = w$ za $a \in \{251, 255\}$,
$\varphi_3(q_{43}, a) = q_{42}$ $\psi_3(q_{43}, a) = w$ za $a \in \{123, 127\}$,
$\varphi_3(q_{43}, a) = q_{46}$ $\psi_3(q_{43}, a) = e$ za $a \in \{31, 63\}$,
$\varphi_3(q_{43}, a) = q_{F_0}$ $\psi_3(q_{43}, a) = 0$ inače,

$\varphi_3(q_{44}, a) = q_{44}$ $\psi_3(q_{44}, a) = w$ za $a \in \{66, 67, 75, 98, 99, 107\}$,
$\varphi_3(q_{44}, a) = q_{39}$ $\psi_3(q_{44}, a) = w$ za $a \in \{194, 195, 203, 226, 227, 235\}$,
$\varphi_3(q_{44}, a) = q_{45}$ $\psi_3(q_{44}, a) = w$ za $a = 106$,
$\varphi_3(q_{44}, a) = q_{43}$ $\psi_3(q_{44}, a) = w$ za $a = 234$,
$\varphi_3(q_{44}, a) = q_{F_1}$ $\psi_3(q_{44}, a) = 0$ za $a \in \{10, 42\}$,
$\varphi_3(q_{44}, a) = q_{F_0}$ $\psi_3(q_{44}, a) = 0$ inače,

$\varphi_3(q_{45}, a) = q_{45}$ $\psi_3(q_{45}, a) = w$ za $a = 107$,
$\varphi_3(q_{45}, a) = q_{43}$ $\psi_3(q_{45}, a) = w$ za $a = 235$,
$\varphi_3(q_{45}, a) = q_{F_1}$ $\psi_3(q_{45}, a) = 0$ za $a \in \{11, 43\}$,
$\varphi_3(q_{45}, a) = q_{F_0}$ $\psi_3(q_{45}, a) = 0$ inače,

$\varphi_3(q_{46}, a) = q_{47}$ $\psi_3(q_{46}, a) = n$ za $a \in \{82, 83, 91, 114, 115, 122, 123, 210, 211, 216, 219, 217, 242, 248, 249, 250, 251, 243\}$,
$\varphi_3(q_{46}, a) = q_{46}$ $\psi_3(q_{46}, a) = e$ za $a \in \{$ $b \in A|$ $b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7$, $a_1 = 1\}$,

$\varphi_3(q_{46}, a) = q_{F_0}$ $\psi_3(q_{46}, a) = 0$ inače,

$\varphi_3(q_{47}, a) = q_{47}$ $\psi_3(q_{47}, a) = w$ za $a \in \{104, 105, 107, 232, 233, 235\}$,
$\varphi_3(q_{47}, a) = q_{48}$ $\psi_3(q_{47}, a) = w$ za $a \in \{248, 249, 251\}$,
$\varphi_3(q_{47}, a) = q_{47}$ $\psi_3(q_{47}, a) = n$ za $a = 123$,
$\varphi_3(q_{47}, a) = q_{51}$ $\psi_3(q_{47}, a) = s$ za $a = 41$,
$\varphi_3(q_{47}, a) = q_{F_1}$ $\psi_3(q_{47}, a) = 0$ za $a \in \{11, 43\}$,

$\varphi_3(q_{47}, a) = q_{F_0}$ $\psi_3(q_{47}, a) = 0$ inače,

$\varphi_3(q_{48}, a) = q_{50}$ $\psi_3(q_{48}, a) = e$ za $a \in \{31, 63\}$,
$\varphi_3(q_{48}, a) = q_{48}$ $\psi_3(q_{48}, a) = w$ za $a = 255$,
$\varphi_3(q_{48}, a) = q_{49}$ $\psi_3(q_{48}, a) = w$ za $a = 127$,
$\varphi_3(q_{48}, a) = q_{F_0}$ $\psi_3(q_{48}, a) = 0$ inače,

$\varphi_3(q_{49}, a) = q_{50}$ $\psi_3(q_{49}, a) = e$ za $a \in \{11, 15, 43, 47, 31\}$,
$\varphi_3(q_{49}, a) = q_{49}$ $\psi_3(q_{49}, a) = w$ za $a \in \{107, 111\}$,

$\varphi_3(q_{49}, a) = q_{F_0}$ $\psi_3(q_{49}, a) = 0$ inače,

$\varphi_3(q_{50}, a) = q_{47}$ $\psi_3(q_{50}, a) = n$ za $a \in \{248, 249, 251\}$,
$\varphi_3(q_{50}, a) = q_{50}$ $\psi_3(q_{50}, a) = e$ za $a \in \{ b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_1 = 1 \}$,
$\varphi_3(q_{50}, a) = q_{F_0}$ $\psi_3(q_{50}, a) = 0$ inače,

$\varphi_3(q_{51}, a) = q_{51}$ $\psi_3(q_{51}, a) = w$ za $a \in \{66, 67, 75, 98, 99, 106, 107, 111, 110, 102, 103, 70, 71, 79, 82, 83, 122, 123, 114, 115, 91\}$,
$\varphi_3(q_{51}, a) = q_{F_1}$ $\psi_3(q_{51}, a) = 0$ za $a \in \{10, 11, 14, 15, 46, 42, 43, 47\}$,
$\varphi_3(q_{51}, a) = q_{F_0}$ $\psi_3(q_{51}, a) = 0$ inače.

Automat $A_5 = (A, Q_5, B, \varphi_5, \psi_5, q_1, Q_F)$ je definisan na sljedeći način:
$Q_5 = \{ q_i \mid i \in \{1, 2, ..., 49\} \} \cup Q_F$,

$\varphi_5(q_1, a) = q_2$ $\psi_5(q_1, a) = w$ za $a \in \{80, 208, 224, 240, 64, 96, 112, 192\}$,
$\varphi_5(q_1, a) = q_{F_0}$ $\psi_5(q_1, a) = 0$ inače,

$\varphi_5(q_2, a) = q_5$ $\psi_5(q_2, a) = e$ za $a \in \{18, 22, 146, 150\}$,
$\varphi_5(q_2, a) = q_8$ $\psi_5(q_2, a) = n$ za $a = 148$,
$\varphi_5(q_2, a) = q_3$ $\psi_5(q_2, a) = s$ za $a \in \{ b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_1 = 0,\ a_0 = 1,\ a_3 = 1 \}$,
$\varphi_5(q_2, a) = q_2$ $\psi_5(q_2, a) = s$ za $a \in \{ b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_0 = 0,\ a_3 = 1 \}$,
$\varphi_5(q_2, a) = q_2$ $\psi_5(q_2, a) = w$ za $a \in \{ b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_3 = 0,\ a_6 = 1 \}$,
$\varphi_5(q_2, a) = q_{F_0}$ $\psi_5(q_2, a) = 0$ inače,

$\varphi_5(q_3, a) = q_3$ $\psi_5(q_3, a) = n$ za $a \in \{ b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_4 = 1,\ a_7 = 0 \}$,
$\varphi_5(q_3, a) = q_3$ $\psi_5(q_3, a) = e$ za $a \in \{ b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_1 = 1 \}$,
$\varphi_5(q_3, a) = q_4$ $\psi_5(q_3, a) = s$ za $a \in \{ b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_1 = 0,\ a_3 = 1,\ a_4 = 0 \}$,

$\varphi_5(q_3, a) = q_{F_0}$ $\psi_5(q_3, a) = 0$ inače,

$\varphi_5(q_4, a) = q_4$ $\psi_5(q_4, a) = s$ za $a \in \{ b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_1 = 1,\ a_3 = 1 \}$,
$\varphi_5(q_4, a) = q_4$ $\psi_5(q_4, a) = e$ za $a \in \{ b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_1 = 1,\ a_2 = 0 \}$,
$\varphi_5(q_4, a) = q_2$ $\psi_5(q_4, a) = w$ za $a \in \{ b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_1 = 0,\ a_3 = 0,\ a_6 = 1 \}$,
$\varphi_5(q_4, a) = q_{F_0}$ $\psi_5(q_4, a) = 0$ inače,

$\varphi_5(q_5, a) = q_6$ $\psi_5(q_5, a) = w$ za $a \in \{208, 212\}$,
$\varphi_5(q_5, a) = q_{13}$ $\psi_5(q_5, a) = w$ za $a \in \{80, 84\}$,
$\varphi_5(q_5, a) = q_5$ $\psi_5(q_5, a) = e$ za $a \in \{ b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_1 = 1,\ a_0 = 0 \}$,
$\varphi_5(q_5, a) = q_{F_0}$ $\psi_5(q_5, a) = 0$ inače,

$\varphi_5(q_6, a) = q_6$ $\psi_5(q_6, a) = w$ za $a \in \{255, 223, 214, 215, \}$,
$\varphi_5(q_6, a) = q_7$ $\psi_5(q_6, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,
$\varphi_5(q_6, a) = q_{13}$ $\psi_5(q_6, a) = w$ za $a \in \{127, 95, 86, 87\}$,

$\varphi_5(q_6, a) = q_{F_0}$ $\psi_5(q_6, a) = 0$ inače,

$\varphi_5(q_7, a) = q_8$ $\psi_5(q_7, a) = n$ za $a \in \{208, 212, 240, 244, 248, 252\}$,

$\varphi_5(q_7, a) = q_7$ $\psi_5(q_7, a) = e$ za $a \in \{b \in A| b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 1\}$,

$\varphi_5(q_7, a) = q_{F_0}$ $\psi_5(q_7, a) = 0$ inače,

$\varphi_5(q_8, a) = q_9$ $\psi_5(q_8, a) = w$ za $a \in \{208, 212, 240, 244\}$,

$\varphi_5(q_8, a) = q_6$ $\psi_5(q_8, a) = w$ za $a \in \{248, 252\}$,

$\varphi_5(q_8, a) = q_{10}$ $\psi_5(q_8, a) = e$ za $a \in \{74, 78, 202, 94, 206, 218, 106, 110, 234, 126, 238, 250, 210, 242\}$,

$\varphi_5(q_8, a) = q_8$ $\psi_5(q_8, a) = e$ za $a \in \{214, 246, 222, 254\}$,

$\varphi_5(q_8, a) = q_{F_0}$ $\psi_5(q_8, a) = 0$ inače,

$\varphi_5(q_9, a) = q_9$ $\psi_5(q_9, a) = w$ za $a \in \{214, 246\}$,

$\varphi_5(q_9, a) = q_6$ $\psi_5(q_9, a) = w$ za $a \in \{222, 254\}$,

$\varphi_5(q_9, a) = q_{F_0}$ $\psi_5(q_9, a) = 0$ inače,

$\varphi_5(q_{10}, a) = q_{10}$ $\psi_5(q_{10}, a) = e$ za $a \in \{98, 102, 118, 246, 226, 230, 66, 70, 86, 214, 194, 198\}$,

$\varphi_5(q_{10}, a) = q_{11}$ $\psi_5(q_{10}, a) = w$ za $a \in \{112, 116, 244, 240, 80, 84, 208, 212\}$,

$\varphi_5(q_{10}, a) = q_{F_0}$ $\psi_5(q_{10}, a) = 0$ inače,

$\varphi_5(q_{11}, a) = q_{11}$ $\psi_5(q_{11}, a) = w$ za $a \in \{98, 102, 118, 246, 66, 70, 86, 214, 242, 210, 226, 230, 194, 198, 146\}$,

$\varphi_5(q_{11}, a) = q_{12}$ $\psi_5(q_{11}, a) = w$ za $a \in \{74, 78, 94, 218, 106, 110, 126, 250, 254, 222, 202, 206, 234, 238\}$,

$\varphi_5(q_{11}, a) = q_{F_0}$ $\psi_5(q_{11}, a) = 0$ inače,

$\varphi_5(q_{12}, a) = q_{12}$ $\psi_5(q_{12}, a) = w$ za $a \in \{255, 223, 215, 251, 219, 211, 79, 71, 111, 107, 75, 67, 214, 66, 210, 203, 207, 194, 195, 235, 239, 198, 199\}$,

$\varphi_5(q_{12}, a) = q_{14}$ $\psi_5(q_{12}, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_5(q_{12}, a) = q_{15}$ $\psi_5(q_{12}, a) = n$ za $a \in \{18, 19, 27, 146, 147, 155\}$,

$\varphi_5(q_{12}, a) = q_{F_0}$ $\psi_5(q_{12}, a) = 0$ inače,

$\varphi_5(q_{13}, a) = q_{13}$ $\psi_5(q_{13}, a) = w$ za $a \in \{211, 67, 210, 66, 255, 223, 70, 71, 107, 75, 215, 111, 79, 219, 251, 214, 194, 195, 198, 199, 203, 207, 235, 239\}$,

$\varphi_5(q_{13}, a) = q_{14}$ $\psi_5(q_{13}, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_5(q_{13}, a) = q_{15}$ $\psi_5(q_{13}, a) = n$ za $a \in \{18, 19, 27, 146, 147, 155\}$,

$\varphi_5(q_{13}, a) = q_{F_0}$ $\psi_5(q_{13}, a) = 0$ inače,

$\varphi_5(q_{14}, a) = q_{15}$ $\psi_5(q_{14}, a) = n$ za $a \in \{210, 211, 219, 218, 250, 251, 242\}$,

$\varphi_5(q_{14}, a) = q_{14}$ $\psi_5(q_{14}, a) = e$ za $a \in \{b \in A| b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 1\}$,

$\varphi_5(q_{14}, a) = q_{14}$ $\psi_5(q_{14}, a) = 0$ inače,

$\varphi_5(q_{15}, a) = q_{15}$ $\psi_5(q_{15}, a) = w$ za $a \in \{248, 232, 104, 105, 249, 233, 219, 217, 201, 73, 67, 195, 211, 214, 66, 194, 210, 216, 200, 72, 107, 235, 75, 203, 215, 255, 223, 251\}$,

$\varphi_5(q_{15}, a) = q_{15}$ $\psi_5(q_{15}, a) = n$ za $a \in \{18, 19, 24, 25, 27, 146, 147, 152, 153, 155\}$,

$\varphi_5(q_{15}, a) = q_{16}$ $\psi_5(q_{15}, a) = e$ za $a \in \{22, 23, 31, 151, 150, 159\}$,

$\varphi_5(q_{15}, a) = q_{17}$ $\psi_5(q_{15}, a) = e$ za $a \in \{2, 3, 11\}$,

$\varphi_5(q_{15}, a) = q_{17}$ $\psi_5(q_{15}, a) = s$ za $a \in \{8, 9\}$,

$\varphi_5(q_{15}, a) = q_{F_0}$ $\psi_5(q_{15}, a) = 0$ inače,

$\varphi_5(q_{16}, a) = q_{15}$ $\psi_5(q_{16}, a) = n$ za $a \in \{210, 211, 216, 217, 219, 248, 249, 251\}$,

$\varphi_5(q_{16}, a) = q_{16}$ $\psi_5(q_{16}, a) = e$ za $a \in \{b \in A| b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 1\}$,

$\varphi_5(q_{16}, a) = q_{F_0}$ $\psi_5(q_{16}, a) = 0$ inače,

$\varphi_5(q_{17}, a) = q_{18}$ $\psi_5(q_{17}, a) = n$ za $a \in \{80, 84, 86, 112, 116, 118, 120, 124, 126, 127\}$,

$\varphi_5(q_{17}, a) = q_{17}$ $\psi_5(q_{17}, a) = s$ za $a \in \{b \in A| b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 0\}$,

$\varphi_5(q_{17}, a) = q_{17}$ $\psi_5(q_{17}, a) = e$ za $a \in \{b \in A| b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 1\}$,

$\varphi_5(q_{17}, a) = q_{F_0}$ $\psi_5(q_{17}, a) = 0$ inače,

$\varphi_5(q_{18}, a) = q_{18}$ $\psi_5(q_{18}, a) = e$ za $a \in \{43, 47, 107, 111, 127, 255, 254, 126, 246, 214, 63, 31, 62, 46, 42, 11, 15, 30, 14, 10, 106, 110, 66, 70, 98, 102, 118, 86\}$,

$\varphi_5(q_{18}, a) = q_{18}$ $\psi_5(q_{18}, a) = n$ za $a \in \{56, 60, 184, 24, 28, 152, 120, 124, 112, 116, 80, 84\}$,

$\varphi_5(q_{18}, a) = q_{20}$ $\psi_5(q_{18}, a) = e$ za $a \in \{26, 27, 58, 59, 154, 155, 158, 159, 186, 187, 190, 191, 210, 242, 250, 251\}$,

$\varphi_5(q_{18}, a) = q_{19}$ $\psi_5(q_{18}, a) = w$ za $a \in \{208, 212, 240, 244, 248, 252\}$,

$\varphi_5(q_{18}, a) = q_{22}$ $\psi_5(q_{18}, a) = w$ za $a \in \{72, 200, 216\}$,

$\varphi_5(q_{18}, a) = q_{F_0}$ $\psi_5(q_{18}, a) = 0$ inače,

$\varphi_5(q_{19}, a) = q_{18}$ $\psi_5(q_{19}, a) = n$ za $a \in \{30, 31, 62, 63, 86, 118, 126, 127\}$,

$\varphi_5(q_{19}, a) = q_{19}$ $\psi_5(q_{19}, a) = w$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, \ a_6 = 1\}$,

$\varphi_5(q_{19}, a) = q_{F_0}$ $\psi_5(q_{19}, a) = 0$ inače,

$\varphi_5(q_{20}, a) = q_{20}$ $\psi_5(q_{20}, a) = e$ za $a \in \{234, 235, 250, 251, 254, 255, 242, 246, 106, 107, 210, 214\}$,

$\varphi_5(q_{20}, a) = q_{22}$ $\psi_5(q_{20}, a) = n$ za $a \in \{240, 248, 249\}$,

$\varphi_5(q_{20}, a) = q_{21}$ $\psi_5(q_{20}, a) = w$ za $a \in \{104, 105, 96, 208, 192, 224, 232, 233\}$,

$\varphi_5(q_{20}, a) = q_{F_0}$ $\psi_5(q_{20}, a) = 0$ inače,

$\varphi_5(q_{21}, a) = q_{22}$ $\psi_5(q_{21}, a) = n$ za $a \in \{26, 27, 58, 59, 154, 155, 186, 187, 210, 242, 250, 251\}$,

$\varphi_5(q_{21}, a) = q_{21}$ $\psi_5(q_{21}, a) = w$ za $a \in \{106, 107, 234, 235\}$,

$\varphi_5(q_{21}, a) = q_{F_0}$ $\psi_5(q_{21}, a) = 0$ inače,

$\varphi_5(q_{22}, a) = q_{22}$ $\psi_5(q_{22}, a) = w$ za $a \in \{214, 66, 194, 210, 216, 200, 72, 107, 235, 75, 203, 215, 255, 223, 251, 219, 217, 201, 73, 67, 195, 211, 248, 232, 104, 249, 233, 105\}$,

$\varphi_5(q_{22}, a) = q_{22}$ $\psi_5(q_{22}, a) = n$ za $a \in \{18, 19, 24, 25, 27, 146, 147, 152, 153, 155\}$,

$\varphi_5(q_{22}, a) = q_{24}$ $\psi_5(q_{22}, a) = w$ za $a \in \{99, 227, 95, 127, 83, 115, 242, 243, 87, 247, 119, 91, 123, 98, 226, 82, 114, 86, 118, 246\}$,

$\varphi_5(q_{22}, a) = q_{23}$ $\psi_5(q_{22}, a) = e$ za $a \in \{22, 23, 31, 63, 150, 151, 159\}$,

$\varphi_5(q_{22}, a) = q_{F_0}$ $\psi_5(q_{22}, a) = 0$ inače,

$\varphi_5(q_{23}, a) = q_{22}$ $\psi_5(q_{23}, a) = n$ za $a \in \{210, 211, 216, 217, 219, 248, 249, 251\}$,

$\varphi_5(q_{23}, a) = q_{23}$ $\psi_5(q_{23}, a) = e$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, \ a_1 = 1\}$,

$\varphi_5(q_{23}, a) = q_{F_0}$ $\psi_5(q_{23}, a) = 0$ inače,

$\varphi_5(q_{24}, a) = q_{24}$ $\psi_5(q_{24}, a) = w$ za $a \in \{66, 67, 98, 99, 75, 107, 102, 70, 71, 103, 79, 111\}$,

$\varphi_5(q_{24}, a) = q_{25}$ $\psi_5(q_{24}, a) = s$ za $a \in \{106, 42, 10, 234, 110, 46, 14, 250, 122, 126, 254, 62, 30\}$,

$\varphi_5(q_{24}, a) = q_{F_0}$ $\psi_5(q_{24}, a) = 0$ inače,

$\varphi_5(q_{25}, a) = q_{25}$ $\psi_5(q_{25}, a) = w$ za $a \in \{66, 98, 255, 127, 254, 126, 214, 86, 246, 252, 244, 212,$

124, 116, 84, 111, 110, 102, 70, 120, 112, 80, 107, 106, 118\},

$\varphi_5(q_{25}, a) = q_{25}$ $\psi_5(q_{25}, a) = s$ za $a \in \{30, 62, 10, 42, 28, 60, 46, 14, 24, 56\}$,

$\varphi_5(q_{25}, a) = q_{26}$ $\psi_5(q_{25}, a) = e$ za $a \in \{63, 31, 43, 47, 11, 15\}$,

$\varphi_5(q_{25}, a) = q_{27}$ $\psi_5(q_{25}, a) = w$ za $a \in \{194, 198, 226, 230, 234, 235, 238, 239\}$,

$\varphi_5(q_{25}, a) = q_{F_0}$ $\psi_5(q_{25}, a) = 0$ inače ,

$\varphi_5(q_{26}, a) = q_{25}$ $\psi_5(q_{26}, a) = s$ za $a \in \{106, 110, 120, 124, 126, 248, 252, 254\}$,

$\varphi_5(q_{26}, a) = q_{26}$ $\psi_5(q_{26}, a) = e$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, \ a_1 = 1\}$,

$\varphi_5(q_{26}, a) = q_{F_0}$ $\psi_5(q_{26}, a) = 0$ inače,

$\varphi_5(q_{27}, a) = q_{27}$ $\psi_5(q_{27}, a) = w$ za $a \in \{250, 251, 210, 242, 255, 214, 246, 254\}$,

$\varphi_5(q_{27}, a) = q_{27}$ $\psi_5(q_{27}, a) = s$ za $a \in \{30, 26\}$,

$\varphi_5(q_{27}, a) = q_{28}$ $\psi_5(q_{27}, a) = s$ za $a \in \{31, 27\}$,

$\varphi_5(q_{27}, a) = q_{30}$ $\psi_5(q_{27}, a) = e$ za $a \in \{18, 22\}$,

$\varphi_5(q_{27}, a) = q_{30}$ $\psi_5(q_{27}, a) = n$ za $a = 20$,

$\varphi_5(q_{27}, a) = q_{F_0}$ $\psi_5(q_{27}, a) = 0$ inače,

$\varphi_5(q_{28}, a) = q_{28}$ $\psi_5(q_{28}, a) = e$ za $a \in \{30, 31, 214, 246, 254, 255\}$,

$\varphi_5(q_{28}, a) = q_{27}$ $\psi_5(q_{28}, a) = w$ za $a \in \{208, 212, 240, 244, 248, 252\}$,

$\varphi_5(q_{28}, a) = q_{29}$ $\psi_5(q_{28}, a) = e$ za $a = 22$,

$\varphi_5(q_{28}, a) = q_{F_0}$ $\psi_5(q_{28}, a) = 0$ inače,

$\varphi_5(q_{29}, a) = q_{30}$ $\psi_5(q_{29}, a) = n$ za $a \in \{208, 212\}$,

$\varphi_5(q_{29}, a) = q_{29}$ $\psi_5(q_{29}, a) = e$ za $a = 214$,

$\varphi_5(q_{29}, a) = q_{F_0}$ $\psi_5(q_{29}, a) = 0$ inače,

$\varphi_5(q_{30}, a) = q_{31}$ $\psi_5(q_{30}, a) = e$ za $a \in \{215, 87, 71, 67, 83, 211, 195, 115, 243, 227, 247, 119, 103, 99\}$,

$\varphi_5(q_{30}, a) = q_{30}$ $\psi_5(q_{30}, a) = n$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, \ a_1 = 0\}$,

$\varphi_5(q_{30}, a) = q_{30}$ $\psi_5(q_{30}, a) = e$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, \ a_1 = 1, a_0 = 0\}$,

$\varphi_5(q_{30}, a) = q_{F_0}$ $\psi_5(q_{30}, a) = 0$ inače,

$\varphi_5(q_{31}, a) = q_{32}$ $\psi_5(q_{31}, a) = w$ za $a \in \{200, 201, 232, 233, 216, 217, 248, 249\}$,

$\varphi_5(q_{31}, a) = q_{37}$ $\psi_5(q_{31}, a) = w$ za $a \in \{72, 73, 104, 105\}$,

$\varphi_5(q_{31}, a) = q_{31}$ $\psi_5(q_{31}, a) = e$ za $a \in \{$ $b \in A|$ $b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7$, $a_1 = 1\}$,
$\varphi_5(q_{31}, a) = q_{F_0}$ $\psi_5(q_{31}, a) = 0$ inače,

$\varphi_5(q_{32}, a) = q_{32}$ $\psi_5(q_{32}, a) = w$ za $a \in \{210, 211, 242, 243, 219, 251, 214, 246, 255, 223, 247, 215\}$,
$\varphi_5(q_{32}, a) = q_{33}$ $\psi_5(q_{32}, a) = w$ za $a \in \{91, 95, 82, 83, 115, 86, 87, 119, 114, 118\}$,
$\varphi_5(q_{32}, a) = q_{39}$ $\psi_5(q_{32}, a) = e$ za $a \in \{30, 62\}$,
$\varphi_5(q_{32}, a) = q_{35}$ $\psi_5(q_{32}, a) = w$ za $a \in \{122, 126\}$,
$\varphi_5(q_{32}, a) = q_{34}$ $\psi_5(q_{32}, a) = w$ za $a \in \{123, 127\}$,
$\varphi_5(q_{32}, a) = q_{36}$ $\psi_5(q_{32}, a) = w$ za $a \in \{250, 254\}$,
$\varphi_5(q_{32}, a) = q_{F_0}$ $\psi_5(q_{32}, a) = 0$ inače,

$\varphi_5(q_{33}, a) = q_{33}$ $\psi_5(q_{33}, a) = w$ za $a \in \{66, 67, 70, 71, 98, 99, 102, 103\}$,
$\varphi_5(q_{33}, a) = q_{35}$ $\psi_5(q_{33}, a) = w$ za $a \in \{106, 110\}$,
$\varphi_5(q_{33}, a) = q_{39}$ $\psi_5(q_{33}, a) = e$ za $a \in \{10, 14, 42, 46\}$,
$\varphi_5(q_{33}, a) = q_{F_0}$ $\psi_5(q_{33}, a) = 0$ inače,

$\varphi_5(q_{34}, a) = q_{34}$ $\psi_5(q_{34}, a) = w$ za $a \in \{107, 111\}$,
$\varphi_5(q_{34}, a) = q_{33}$ $\psi_5(q_{34}, a) = w$ za $a \in \{75, 79\}$,
$\varphi_5(q_{34}, a) = q_{F_0}$ $\psi_5(q_{34}, a) = 0$ inače,

$\varphi_5(q_{35}, a) = q_{35}$ $\psi_5(q_{35}, a) = w$ za $a \in \{107, 111\}$,
$\varphi_5(q_{35}, a) = q_{39}$ $\psi_5(q_{35}, a) = e$ za $a \in \{11, 15, 43, 47\}$,
$\varphi_5(q_{35}, a) = q_{F_0}$ $\psi_5(q_{35}, a) = 0$ inače,

$\varphi_5(q_{36}, a) = q_{36}$ $\psi_5(q_{36}, a) = w$ za $a \in \{251, 255\}$,
$\varphi_5(q_{36}, a) = q_{35}$ $\psi_5(q_{36}, a) = w$ za $a \in \{123, 127\}$,
$\varphi_5(q_{36}, a) = q_{39}$ $\psi_5(q_{36}, a) = e$ za $a \in \{31, 63\}$,
$\varphi_5(q_{36}, a) = q_{F_0}$ $\psi_5(q_{36}, a) = 0$ inače,

$\varphi_5(q_{37}, a) = q_{37}$ $\psi_5(q_{37}, a) = w$ za $a \in \{66, 67, 75, 98, 99, 107\}$,
$\varphi_5(q_{37}, a) = q_{32}$ $\psi_5(q_{37}, a) = w$ za $a \in \{194, 195, 203, 226, 227, 235\}$,
$\varphi_5(q_{37}, a) = q_{38}$ $\psi_5(q_{37}, a) = w$ za $a = 106$,
$\varphi_5(q_{37}, a) = q_{36}$ $\psi_5(q_{37}, a) = w$ za $a = 234$,
$\varphi_5(q_{37}, a) = q_{45}$ $\psi_5(q_{37}, a) = s$ za $a \in \{10, 42\}$,
$\varphi_5(q_{37}, a) = q_{F_0}$ $\psi_5(q_{37}, a) = 0$ inače,

$\varphi_5(q_{38}, a) = q_{38}$ $\psi_5(q_{38}, a) = w$ za $a = 107$,
$\varphi_5(q_{38}, a) = q_{36}$ $\psi_5(q_{38}, a) = w$ za $a = 235$,
$\varphi_5(q_{38}, a) = q_{45}$ $\psi_5(q_{38}, a) = s$ za $a \in \{11, 43\}$,

$\varphi_5(q_{38}, a) = q_{F_0}$ $\psi_5(q_{38}, a) = 0$ inače,

$\varphi_5(q_{39}, a) = q_{40}$ $\psi_5(q_{39}, a) = n$ za $a \in \{82, 83, 91, 114, 115, 122, 123, 210, 211, 216, 219, 217, 242, 248, 249, 250, 251, 243\}$,
$\varphi_5(q_{39}, a) = q_{39}$ $\psi_5(q_{39}, a) = e$ za $a \in \{$ $b \in A|$ $b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7$, $a_1 = 1\}$,
$\varphi_5(q_{39}, a) = q_{F_0}$ $\psi_5(q_{39}, a) = 0$ inače,

$\varphi_5(q_{40}, a) = q_{40}$ $\psi_5(q_{40}, a) = w$ za $a \in \{104, 105, 107, 232, 233, 235\}$,
$\varphi_5(q_{40}, a) = q_{41}$ $\psi_5(q_{40}, a) = w$ za $a \in \{248, 249, 251\}$,
$\varphi_5(q_{40}, a) = q_{40}$ $\psi_5(q_{40}, a) = n$ za $a = 123$,
$\varphi_5(q_{40}, a) = q_{44}$ $\psi_5(q_{40}, a) = s$ za $a = 41$,
$\varphi_5(q_{40}, a) = q_{45}$ $\psi_5(q_{40}, a) = s$ za $a \in \{11, 43\}$,
$\varphi_5(q_{40}, a) = q_{F_0}$ $\psi_5(q_{40}, a) = 0$ inače,

$\varphi_5(q_{41}, a) = q_{43}$ $\psi_5(q_{41}, a) = e$ za $a \in \{31, 63\}$,
$\varphi_5(q_{41}, a) = q_{41}$ $\psi_5(q_{41}, a) = w$ za $a = 255$,
$\varphi_5(q_{41}, a) = q_{42}$ $\psi_5(q_{41}, a) = w$ za $a = 127$,
$\varphi_5(q_{41}, a) = q_{F_0}$ $\psi_5(q_{41}, a) = 0$ inače,

$\varphi_5(q_{42}, a) = q_{43}$ $\psi_5(q_{42}, a) = e$ za $a \in \{11, 15, 31, 43, 47\}$,
$\varphi_5(q_{42}, a) = q_{42}$ $\psi_5(q_{42}, a) = w$ za $a \in \{107, 111\}$,
$\varphi_5(q_{42}, a) = q_{F_0}$ $\psi_5(q_{42}, a) = 0$ inače,

$\varphi_5(q_{43}, a) = q_{40}$ $\psi_5(q_{43}, a) = n$ za $a \in \{248, 249, 251\}$,
$\varphi_5(q_{43}, a) = q_{43}$ $\psi_5(q_{43}, a) = e$ za $a \in \{$ $b \in A|$ $b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7$, $a_1 = 1\}$,
$\varphi_5(q_{43}, a) = q_{F_0}$ $\psi_5(q_{43}, a) = 0$ inače,

$\varphi_5(q_{44}, a) = q_{44}$ $\psi_5(q_{44}, a) = w$ za $a \in \{66, 67, 75, 98, 99, 106, 107, 111, 110, 102, 103, 70, 71, 79, 82, 83, 122, 123, 114, 115, 91\}$,
$\varphi_5(q_{44}, a) = q_{45}$ $\psi_5(q_{44}, a) = s$ za $a \in \{10, 11, 14, 15, 42, 43, 46, 47\}$,
$\varphi_5(q_{44}, a) = q_{F_0}$ $\psi_5(q_{44}, a) = 0$ inače.

$\varphi_5(q_{45}, a) = q_{46}$ $\psi_5(q_{45}, a) = n$ za $a \in \{26, 27, 31, 18\}$,
$\varphi_5(q_{45}, a) = q_{45}$ $\psi_5(q_{45}, a) = s$ za $a \in \{$ $b \in A|$ $b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7$, $a_6 = 0\}$,
$\varphi_5(q_{45}, a) = q_{45}$ $\psi_5(q_{45}, a) = w$ za $a \in \{$ $b \in A|$ $b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7$, $a_6 = 1\}$,
$\varphi_5(q_{45}, a) = q_{F_0}$ $\psi_5(q_{45}, a) = 0$ inače,

$\varphi_5(q_{46}, a) = q_{46}$ $\psi_5(q_{46}, a) = e$ za $a \in \{11, 31, 255, 107\}$,

$\varphi_5(q_{46}, a) = q_{46}$ $\psi_5(q_{46}, a) = n$ za $a \in \{24, 25, 28, 29\}$,

$\varphi_5(q_{46}, a) = q_{48}$ $\psi_5(q_{46}, a) = e$ za $a \in \{10, 30, 106, 254\}$,

$\varphi_5(q_{46}, a) = q_{47}$ $\psi_5(q_{46}, a) = n$ za $a \in \{248, 249\}$,

$\varphi_5(q_{46}, a) = q_{47}$ $\psi_5(q_{46}, a) = w$ za $a \in \{252, 253\}$,

$\varphi_5(q_{46}, a) = q_{F_0}$ $\psi_5(q_{46}, a) = 0$ inače,

$\varphi_5(q_{47}, a) = q_{47}$ $\psi_5(q_{47}, a) = w$ za $a \in \{248, 255, 252\}$,

$\varphi_5(q_{47}, a) = q_{46}$ $\psi_5(q_{47}, a) = n$ za $a = 31$,

$\varphi_5(q_{47}, a) = q_{F_0}$ $\psi_5(q_{47}, a) = 0$ inače,

$\varphi_5(q_{48}, a) = q_{48}$ $\psi_5(q_{48}, a) = e$ za $a \in \{11, 31, 107, 255, 214, 246, 66, 98\}$,

$\varphi_5(q_{48}, a) = q_{49}$ $\psi_5(q_{48}, a) = n$ za $a \in \{208, 248, 240\}$,

$\varphi_5(q_{48}, a) = q_{F_1}$ $\psi_5(q_{48}, a) = 0$ za $a \in \{104, 64, 96\}$,

$\varphi_5(q_{48}, a) = q_{F_0}$ $\psi_5(q_{48}, a) = 0$ inače,

$\varphi_5(q_{49}, a) = q_{49}$ $\psi_5(q_{49}, a) = w$ za $a \in \{104, 248, 107, 255\}$,

$\varphi_5(q_{49}, a) = q_{48}$ $\psi_5(q_{49}, a) = n$ za $a = 31$,

$\varphi_5(q_{49}, a) = q_{F_1}$ $\psi_5(q_{49}, a) = 0$ za $a = 11$,

$\varphi_5(q_{49}, a) = q_{F_0}$ $\psi_5(q_{49}, a) = 0$ inače.

Automat $A_7 = (A, Q_7, B, \varphi_7, \psi_7, q_7, Q_F)$ je definisan na sljedeći način:
$Q_7 = \{q_i \mid i \in \{1, ..., 10\}\} \cup Q_F$

$\varphi_7(q_1, a) = q_2$ $\psi_7(q_1, a) = w$ za $a = 208$,
$\varphi_7(q_1, a) = q_2$ $\psi_7(q_1, a) = n$ za $a \in \{16, 20\}$,
$\varphi_7(q_1, a) = q_4$ $\psi_7(q_1, a) = w$ za $a = 212$,
$\varphi_7(q_1, a) = q_{F_0}$ $\psi_7(q_1, a) = 0$ inače,

$\varphi_7(q_2, a) = q_2$ $\psi_7(q_2, a) = w$ za $a \in \{214, 248, 255\}$,
$\varphi_7(q_2, a) = q_4$ $\psi_7(q_2, a) = w$ za $a \in \{124, 252\}$,
$\varphi_7(q_2, a) = q_3$ $\psi_7(q_2, a) = n$ za $a \in \{22, 31\}$,
$\varphi_7(q_2, a) = q_5$ $\psi_7(q_2, a) = e$ za $a \in \{10, 14\}$,
$\varphi_7(q_2, a) = q_2$ $\psi_7(q_2, a) = n$ za $a \in \{24, 28\}$,
$\varphi_7(q_2, a) = q_{F_0}$ $\psi_7(q_2, a) = 0$ inače,

$\varphi_7(q_3, a) = q_3$ $\psi_7(q_3, a) = e$ za $a \in \{31, 255\}$,
$\varphi_7(q_3, a) = q_2$ $\psi_7(q_3, a) = n$ za $a = 248$,
$\varphi_7(q_3, a) = q_5$ $\psi_7(q_3, a) = e$ za $a \in \{11, 15\}$,
$\varphi_7(q_3, a) = q_4$ $\psi_7(q_3, a) = w$ za $a = 252$,
$\varphi_7(q_3, a) = q_{F_0}$ $\psi_7(q_3, a) = 0$ inače,

$\varphi_7(q_4, a) = q_4$ $\psi_7(q_4, a) = w$ za $a \in \{107, 111, 127, 214, 255\}$,
$\varphi_7(q_4, a) = q_5$ $\psi_7(q_4, a) = e$ za $a \in \{11, 15\}$,
$\varphi_7(q_4, a) = q_5$ $\psi_7(q_4, a) = n$ za $a \in \{22, 31\}$,
$\varphi_7(q_4, a) = q_{F_0}$ $\psi_7(q_4, a) = 0$ inače,

$\varphi_7(q_5, a) = q_5$ $\psi_7(q_5, a) = e$ za $a \in \{11, 15, 86, 106, 107, 111, 110, 127, 126, 254, 255, 214, 246, 66, 70, 98, 102, 118\}$,
$\varphi_7(q_5, a) = q_6$ $\psi_7(q_5, a) = n$ za $a \in \{80, 84, 112, 116, 124\}$,

$\varphi_7(q_5, a) = q_7$ $\psi_7(q_5, a) = w$ za $a \in \{208, 212, 240, 244, 252\}$,
$\varphi_7(q_5, a) = q_{F_0}$ $\psi_7(q_5, a) = 0$ inače,

$\varphi_7(q_6, a) = q_6$ $\psi_7(q_6, a) = e$ za $a \in \{43, 47, 107, 111, 126, 127, 254, 255, 246, 214, 63, 31, 62, 42, 46, 11, 15, 10, 14, 66, 30, 70, 106, 110, 98, 102, 86, 118\}$,
$\varphi_7(q_6, a) = q_6$ $\psi_7(q_6, a) = n$ za $a \in \{56, 60, 24, 28, 80, 84, 112, 116, 120, 124, 152, 184\}$,
$\varphi_7(q_6, a) = q_7$ $\psi_7(q_6, a) = w$ za $a \in \{208, 212, 240, 244, 248, 252\}$,
$\varphi_7(q_6, a) = q_8$ $\psi_7(q_6, a) = e$ za $a \in \{158, 159, 190, 191\}$,
$\varphi_7(q_6, a) = q_9$ $\psi_7(q_6, a) = w$ za $a \in \{72, 216\}$,
$\varphi_7(q_6, a) = q_{F_0}$ $\psi_7(q_6, a) = 0$ inače,

$\varphi_7(q_7, a) = q_6$ $\psi_7(q_7, a) = n$ za $a \in \{62, 63, 30, 31, 126, 127, 86, 118\}$,
$\varphi_7(q_7, a) = q_7$ $\psi_7(q_7, a) = w$ za $a \in \{ b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_6 = 1\}$,
$\varphi_7(q_7, a) = q_{F_0}$ $\psi_7(q_7, a) = 0$ inače,

$\varphi_7(q_8, a) = q_8$ $\psi_7(q_8, a) = e$ za $a \in \{214, 246, 254, 255\}$,
$\varphi_7(q_8, a) = q_9$ $\psi_7(q_8, a) = n$ za $a \in \{208, 240, 248\}$,
$\varphi_7(q_8, a) = q_{F_0}$ $\psi_7(q_8, a) = 0$ inače,

$\varphi_7(q_9, a) = q_9$ $\psi_7(q_9, a) = w$ za $a \in \{66, 67, 104, 75, 107, 255, 214, 215, 223, 248\}$,

$\varphi_7(q_9, a) = q_{10} \; \psi_7(q_9, a) = n$ za $a \in \{22, 23, 31\}$,

$\varphi_7(q_9, a) = q_{F_1} \; \psi_7(q_9, a) = 0$ za $a \in \{2, 3, 11\}$,

$\varphi_7(q_9, a) = q_{F_0} \; \psi_7(q_9, a) = 0$ inače,

$\varphi_7(q_{10}, a) = q_{10} \; \psi_7(q_{10}, a) = e$ za $a \in \{11, 31, 107, 255\}$,

$\varphi_7(q_{10}, a) = q_9 \; \psi_7(q_{10}, a) = n$ za $a = 248$,

$\varphi_7(q_{10}, a) = q_{F_1} \; \psi_7(q_{10}, a) = 0$ za $a = 104$,

$\varphi_7(q_{10}, a) = q_{F_0} \; \psi_7(q_{10}, a) = 0$ inače.

Dodatak II

Kolektiv $S_4 = (A_4, K_4)$ je definisan na sledeći način:
$Q_4 = \{q_i \mid i \in \{1, ..., 31\} \} \cup Q_F$,

$\varphi_4(q_1, a) = q_2 \ \psi_4(q_1, a) = w$ za $a \in \{208, 212\}$,
$\varphi_4(q_1, a) = q_2 \ \psi_4(q_1, a) = n$ za $a \in \{16, 148\}$,
$\varphi_4(q_1, a) = q_{F_0} \ \psi_4(q_1, a) = 0$ inače,

$\varphi_4(q_2, a) = q_2 \ \psi_4(q_2, a) = w$ za $a \in \{255, 252, 248, 214, \}$,
$\varphi_4(q_2, a) = q_2 \ \psi_4(q_2, a) = n$ za $a \in \{24, 156\}$,
$\varphi_4(q_2, a) = q_3 \ \psi_4(q_2, a) = n$ za $a \in \{22, 31\}$,
$\varphi_4(q_2, a) = q_4 \ \psi_4(q_2, a) = e$ za $a \in \{150, 159\}$,
$\varphi_4(q_2, a) = q_5 \ \psi_4(q_2, a) = n$ za $a = 222$,
$\varphi_4(q_2, a) = q_9 \ \psi_4(q_2, a) = e$ za $a = 90$,
$\varphi_4(q_2, a) = q_{F_0} \ \psi_4(q_2, a) = 0$ inače,

$\varphi_4(q_3, a) = q_3 \ \psi_4(q_3, a) = e$ za $a \in \{255, 31\}$,
$\varphi_4(q_3, a) = q_2 \ \psi_4(q_3, a) = n$ za $a = 248$,
$\varphi_4(q_3, a) = q_4 \ \psi_4(q_3, a) = e$ za $a = 159$,
$\varphi_4(q_3, a) = q_{F_0} \ \psi_4(q_3, a) = 0$ inače,

$\varphi_4(q_4, a) = q_4 \ \psi_4(q_4, a) = e$ za $a \in \{255, 214\}$,
$\varphi_4(q_4, a) = q_5 \ \psi_4(q_4, a) = n$ za $a \in \{212, 252\}$,
$\varphi_4(q_4, a) = q_{F_0} \ \psi_4(q_4, a) = 0$ inače,

$\varphi_4(q_5, a) = q_5 \ \psi_4(q_5, a) = n$ za $a \in \{254, 255\}$,
$\varphi_4(q_5, a) = q_6 \ \psi_4(q_5, a) = w$ za $a \in \{251, 250\}$,
$\varphi_4(q_5, a) = q_7 \ \psi_4(q_5, a) = s$ za $a = 123$,
$\varphi_4(q_5, a) = q_{F_0} \ \psi_4(q_5, a) = 0$ inače,

$\varphi_4(q_6, a) = q_6 \ \psi_4(q_6, a) = w$ za $a = 255$,
$\varphi_4(q_6, a) = q_7 \ \psi_4(q_6, a) = s$ za $a = 127$,
$\varphi_4(q_6, a) = q_8 \ \psi_4(q_6, a) = e$ za $a = 95$,
$\varphi_4(q_6, a) = q_{F_0} \ \psi_4(q_6, a) = 0$ inače,

$\varphi_4(q_7, a) = q_7 \ \psi_4(q_7, a) = s$ za $a = 255$,
$\varphi_4(q_7, a) = q_8 \ \psi_4(q_7, a) = e$ za $a = 223$,
$\varphi_4(q_7, a) = q_9 \ \psi_4(q_7, a) = e$ za $a = 222$,
$\varphi_4(q_7, a) = q_{F_0} \ \psi_4(q_7, a) = 0$ inače,

$\varphi_4(q_8, a) = q_8 \ \psi_4(q_8, a) = e$ za $a = 255$,
$\varphi_4(q_8, a) = q_9 \ \psi_4(q_8, a) = e$ za $a \in \{250, 254\}$,

$\varphi_4(q_8, a) = q_{F_0} \ \psi_4(q_8, a) = 0$ inače,

$\varphi_4(q_9, a) = q_9 \ \psi_4(q_9, a) = e$ za $a \in \{214, 66, 226, 246\}$,
$\varphi_4(q_9, a) = q_{10} \ \psi_4(q_9, a) = w$ za $a \in \{208, 240\}$,
$\varphi_4(q_9, a) = q_{13} \ \psi_4(q_9, a) = w$ za $a \in \{64, 224\}$,
$\varphi_4(q_9, a) = q_{F_0} \ \psi_4(q_9, a) = 0$ inače,

$\varphi_4(q_{10}, a) = q_{11} \ \psi_4(q_{10}, a) = w$ za $a \in \{222, 223\}$,
$\varphi_4(q_{10}, a) = q_{10} \ \psi_4(q_{10}, a) = w$ za $a \in \{214, 246, 254, 255\}$,
$\varphi_4(q_{10}, a) = q_{F_0} \ \psi_4(q_{10}, a) = 0$ inače,

$\varphi_4(q_{11}, a) = q_{11} \ \psi_4(q_{11}, a) = w$ za $a \in \{215, 214, 248, 255\}$,
$\varphi_4(q_{11}, a) = q_{12} \ \psi_4(q_{11}, a) = n$ za $a \in \{22, 23, 31\}$,
$\varphi_4(q_{11}, a) = q_{13} \ \psi_4(q_{11}, a) = w$ za $a \in \{104, 232\}$,
$\varphi_4(q_{11}, a) = q_{F_0} \ \psi_4(q_{11}, a) = 0$ inače,

$\varphi_4(q_{12}, a) = q_{11} \ \psi_4(q_{12}, a) = n$ za $a = 248$,
$\varphi_4(q_{12}, a) = q_{12} \ \psi_4(q_{12}, a) = e$ za $a \in \{31, 255, 27, 251, 235, 107, 111, 127, 123, 11, 15\}$,
$\varphi_4(q_{12}, a) = q_{13} \ \psi_4(q_{12}, a) = w$ za $a \in \{104, 232\}$,
$\varphi_4(q_{12}, a) = q_{F_0} \ \psi_4(q_{12}, a) = 0$ inače,

$\varphi_4(q_{13}, a) = q_{13} \ \psi_4(q_{13}, a) = w$ za $a \in \{107, 235, 251, 255, 66, 226, 250\}$,
$\varphi_4(q_{13}, a) = q_{14} \ \psi_4(q_{13}, a) = n$ za $a \in \{90, 95, 123, 127\}$,
$\varphi_4(q_{13}, a) = q_{F_0} \ \psi_4(q_{13}, a) = 0$ inače,

$\varphi_4(q_{14}, a) = q_{14} \ \psi_4(q_{14}, a) = e$ za $a \in \{63, 255, 31, 159, 191\}$,
$\varphi_4(q_{14}, a) = q_{14} \ \psi_4(q_{14}, a) = n$ za $a \in \{24, 57, 152, 185\}$,
$\varphi_4(q_{14}, a) = q_{15} \ \psi_4(q_{14}, a) = n$ za $a \in \{248, 249\}$,
$\varphi_4(q_{14}, a) = q_{16} \ \psi_4(q_{14}, a) = w$ za $a \in \{72, 88, 216\}$,
$\varphi_4(q_{14}, a) = q_{F_0} \ \psi_4(q_{14}, a) = 0$ inače,

$\varphi_4(q_{15}, a) = q_{14}$ $\psi_4(q_{15}, a) = n$ za $a = 31$,
$\varphi_4(q_{15}, a) = q_{14}$ $\psi_4(q_{15}, a) = e$ za $a = 159$,
$\varphi_4(q_{15}, a) = q_{15}$ $\psi_4(q_{15}, a) = w$ za $a \in \{248, 255, 104, 107, 127, 111, 120\}$,
$\varphi_4(q_{15}, a) = q_{16}$ $\psi_4(q_{15}, a) = w$ za $a \in \{75, 79, 95, 223\}$,
$\varphi_4(q_{15}, a) = q_{F_0}$ $\psi_4(q_{15}, a) = 0$ inače,

$\varphi_4(q_{16}, a) = q_{16}$ $\psi_4(q_{16}, a) = w$ za $a \in \{66, 67, 98, 71, 103, 246, 118, 70, 102, 87, 119, 214, 86, 215, 247, 99\}$,
$\varphi_4(q_{16}, a) = q_{17}$ $\psi_4(q_{16}, a) = s$ za $a \in \{254, 126, 42, 30, 110, 46, 14, 106, 62, 10\}$,
$\varphi_4(q_{16}, a) = q_{F_0}$ $\psi_4(q_{16}, a) = 0$ inače,

$\varphi_4(q_{17}, a) = q_{17}$ $\psi_4(q_{17}, a) = w$ za $a \in \{110, 70, 102, 120, 112, 80, 214, 86, 246, 118, 111, 107, 255, 127, 254, 126, 66, 98, 106, 252, 244, 212, 124, 116, 84, 248, 240, 208\}$,
$\varphi_4(q_{17}, a) = q_{17}$ $\psi_4(q_{17}, a) = s$ za $a \in \{28, 29, 30, 60, 62, 14, 46, 10, 42, 24, 56, 25, 61, 57\}$,
$\varphi_4(q_{17}, a) = q_{18}$ $\psi_4(q_{17}, a) = e$ za $a \in \{11, 15, 31, 43, 47, 63\}$,
$\varphi_4(q_{17}, a) = q_{19}$ $\psi_4(q_{17}, a) = w$ za $a \in \{121, 125, 253, 249\}$,
$\varphi_4(q_{17}, a) = q_{20}$ $\psi_4(q_{17}, a) = w$ za $a \in \{82, 123\}$,
$\varphi_4(q_{17}, a) = q_{21}$ $\psi_4(q_{17}, a) = e$ za $a \in \{18, 27\}$,
$\varphi_4(q_{17}, a) = q_{F_0}$ $\psi_4(q_{17}, a) = 0$ inače,

$\varphi_4(q_{18}, a) = q_{17}$ $\psi_4(q_{18}, a) = s$ za $a \in \{254, 126, 110, 106, 248, 252, 120, 124\}$,
$\varphi_4(q_{18}, a) = q_{18}$ $\psi_4(q_{18}, a) = e$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 1\}$,
$\varphi_4(q_{18}, a) = q_{F_0}$ $\psi_4(q_{18}, a) = 0$ inače,

$\varphi_4(q_{19}, a) = q_{19}$ $\psi_4(q_{19}, a) = w$ za $a \in \{111, 255, 127, 107\}$,
$\varphi_4(q_{19}, a) = q_{20}$ $\psi_4(q_{19}, a) = s$ za $a \in \{43, 47, 63\}$,
$\varphi_4(q_{19}, a) = q_{21}$ $\psi_4(q_{19}, a) = s$ za $a \in \{11, 15, 31\}$,
$\varphi_4(q_{19}, a) = q_{F_0}$ $\psi_4(q_{19}, a) = 0$ inače,

$\varphi_4(q_{20}, a) = q_{20}$ $\psi_4(q_{20}, a) = w$ za $a \in \{66, 70, 86, 127, 111, 107\}$,
$\varphi_4(q_{20}, a) = q_{31}$ $\psi_4(q_{20}, a) = e$ za $a \in \{2, 6, 11, 15\}$,
$\varphi_4(q_{20}, a) = q_{F_0}$ $\psi_4(q_{20}, a) = 0$ inače,

$\varphi_4(q_{21}, a) = q_{21}$ $\psi_4(q_{21}, a) = e$ za $a \in \{31, 255, 22, 214, 251, 210, 199, 194, 66, 71, 235, 239, 107, 111, 70, 82, 86\}$,

$\varphi_4(q_{21}, a) = q_{22}$ $\psi_4(q_{21}, a) = n$ za $a \in \{90, 95, 123, 127\}$,
$\varphi_4(q_{21}, a) = q_{F_0}$ $\psi_4(q_{21}, a) = 0$ inače,

$\varphi_4(q_{22}, a) = q_{22}$ $\psi_4(q_{22}, a) = n$ za $a \in \{63, 31, 159, 191, 24, 57, 152, 185\}$,
$\varphi_4(q_{22}, a) = q_{23}$ $\psi_4(q_{22}, a) = e$ za $a = 75$,
$\varphi_4(q_{22}, a) = q_{24}$ $\psi_4(q_{22}, a) = w$ za $a = 72$
$\varphi_4(q_{22}, a) = q_{26}$ $\psi_4(q_{22}, a) = w$ za $a \in \{79, 88, 95, 216, 223\}$,
$\varphi_4(q_{22}, a) = q_{F_0}$ $\psi_4(q_{22}, a) = 0$ inače,

$\varphi_4(q_{23}, a) = q_{23}$ $\psi_4(q_{23}, a) = e$ za $a = 107$,
$\varphi_4(q_{23}, a) = q_{24}$ $\psi_4(q_{23}, a) = w$ za $a = 104$,
$\varphi_4(q_{23}, a) = q_{26}$ $\psi_4(q_{23}, a) = w$ za $a = 111$,
$\varphi_4(q_{23}, a) = q_{F_0}$ $\psi_4(q_{23}, a) = 0$ inače,

$\varphi_4(q_{24}, a) = q_{24}$ $\psi_4(q_{24}, a) = w$ za $a \in \{98, 99, 66, 67, 75, 107\}$,
$\varphi_4(q_{24}, a) = q_{25}$ $\psi_4(q_{24}, a) = w$ za $a = 106$,
$\varphi_4(q_{24}, a) = q_{F_1}$ $\psi_4(q_{24}, a) = 0$ za $a \in \{10, 42\}$,
$\varphi_4(q_{24}, a) = q_{F_0}$ $\psi_4(q_{24}, a) = 0$ inače,

$\varphi_4(q_{25}, a) = q_{25}$ $\psi_4(q_{24}, a) = w$ za $a = 107$,
$\varphi_4(q_{25}, a) = q_{F_1}$ $\psi_4(q_{25}, a) = 0$ za $a = 11$,
$\varphi_4(q_{25}, a) = q_{F_0}$ $\psi_4(q_{25}, a) = 0$ inače,

$\varphi_4(q_{26}, a) = q_{26}$ $\psi_4(q_{26}, a) = w$ za $a \in \{215, 247, 87, 119, 67, 99, 214, 86, 246, 118, 70, 102, 66, 98, 71, 103, 107, 75\}$,
$\varphi_4(q_{26}, a) = q_{27}$ $\psi_4(q_{26}, a) = w$ za $a \in \{106, 110, 126, 254\}$,
$\varphi_4(q_{26}, a) = q_{28}$ $\psi_4(q_{26}, a) = e$ za $a \in \{14, 30, 46, 62, 10, 42\}$,
$\varphi_4(q_{26}, a) = q_{F_0}$ $\psi_4(q_{26}, a) = 0$ inače,

$\varphi_4(q_{27}, a) = q_{27}$ $\psi_4(q_{27}, a) = w$ za $a \in \{107, 111, 127, 255\}$,
$\varphi_4(q_{27}, a) = q_{28}$ $\psi_4(q_{27}, a) = e$ za $a \in \{15, 31, 63, 47, 11, 43\}$,
$\varphi_4(q_{27}, a) = q_{F_0}$ $\psi_4(q_{27}, a) = 0$ inače,

$\varphi_4(q_{28}, a) = q_{28}$ $\psi_4(q_{28}, a) = e$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 1\}$,
$\varphi_4(q_{28}, a) = q_{29}$ $\psi_4(q_{28}, a) = n$ za $a \in \{88, 120, 216, 248\}$,
$\varphi_4(q_{28}, a) = q_{F_0}$ $\psi_4(q_{28}, a) = 0$ inače,

$\varphi_4(q_{29}, a) = q_{28}$ $\psi_4(q_{29}, a) = e$ za $a \in \{11, 15, 31, 43, 47, 63\}$,

$\varphi_4(q_{29}, a) = q_{29}$ $\psi_4(q_{29}, a) = w$ za $a \in \{248, 127, 111, 107, 120, 255\}$,

$\varphi_4(q_{29}, a) = q_{F_1}$ $\psi_4(q_{29}, a) = 0$ za $a = 40$,

$\varphi_4(q_{29}, a) = q_{30}$ $\psi_4(q_{29}, a) = w$ za $a = 104$,

$\varphi_4(q_{29}, a) = q_{F_0}$ $\psi_4(q_{29}, a) = 0$ inače,

$\varphi_4(q_{30}, a) = q_{30}$ $\psi_4(q_{30}, a) = w$ za $a = 107$,

$\varphi_4(q_{30}, a) = q_{F_1}$ $\psi_4(q_{30}, a) = 0$ za $a \in \{11, 43\}$,

$\varphi_4(q_{30}, a) = q_{F_0}$ $\psi_4(q_{30}, a) = 0$ inače,

$\varphi_4(q_{31}, a) = q_{31}$ $\psi_4(q_{31}, a) = e$ za $a \in \{66, 70, 107, 111\}$,

$\varphi_4(q_{31}, a) = q_{21}$ $\psi_4(q_{31}, a) = e$ za $a \in \{82, 123, 86, 127\}$,

$\varphi_4(q_{31}, a) = q_{F_0}$ $\psi_4(q_{31}, a) = 0$ inače,

Neka je M = $\{90, 95, 123, 127\} \subseteq$ A. Tada,

$\psi_{k4}(q_{k4}, (\{q_i\}, a)) = \psi_4(q_i, (\{q_{k4}\}, a))$ za $i \in \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12\}$, $a \in$ A,

$\psi_{k4}(q_{k4}, (\{q_{13}\}, a)) = 0$ $a \in$ M,
$\psi_{k4}(q_{k4}, (\{q_{13}\}, a)) = \psi_4(q_{13}, (\{q_{k4}\}, a))$ za $a \notin$ M,

$\psi_{k4}(q_{k4}, (\{q_{21}\}, a)) = 0$, $a \in$ A,
$\varphi_4(q_{21}, (\{q_{k4}\}, a)) = q_{22}$ $\psi_4(q_{21}, (\{q_{k4}\}, a)) = n$ za $a \in$ M
$\varphi_4(q_{21}, (\{\lambda\}, a)) = q_{F_0}$ $\psi_4(q_{21}, (\{\lambda\}, a)) = 0$ za $a \in$ M, tj. ako se automati A_4, K_4 ne susretnu,

Kolektiv $S_6 = (A_6, K_6)$ je definisan na sljedeći način:
$Q_6 = \{q_i \mid i \in \{1, ..., 81\}\} \cup Q_F$.

$\varphi_6(q_1, a) = q_2$ $\psi_6(q_1, a) = e$ za $a \in \{18, 19, 22, 23\}$,
$\varphi_6(q_1, a) = q_{F_0}$ $\psi_6(q_1, a) = 0$ inače,

$\varphi_6(q_2, a) = q_{10}$ $\psi_0(q_2, a) = w$ za $a \in \{80, 84\}$,
$\varphi_6(q_2, a) = q_3$ $\psi_6(q_2, a) = w$ za $a \in \{208, 212\}$,
$\varphi_6(q_2, a) = q_5$ $\psi_6(q_2, a) = n$ za $a = 148$,
$\varphi_6(q_2, a) = q_2$ $\psi_6(q_2, a) = e$ za $a \in \{b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 1, a_3 = 0\}$,
$\varphi_6(q_2, a) = q_2$ $\psi_6(q_2, a) = s$ za $a \in \{b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_3 = 1\}$,
$\varphi_6(q_2, a) = q_{F_0}$ $\psi_6(q_2, a) = 0$ inače,

$\varphi_6(q_3, a) = q_3$ $\psi_6(q_3, a) = w$ za $a \in \{255, 223, 214, 215, \}$,
$\varphi_6(q_3, a) = q_4$ $\psi_6(q_3, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,
$\varphi_6(q_3, a) = q_{10}$ $\psi_6(q_3, a) = w$ za $a \in \{127, 95, 86, 87\}$,

$\varphi_6(q_3, a) = q_{F_0}$ $\psi_6(q_3, a) = 0$ inače,

$\varphi_6(q_4, a) = q_5$ $\psi_6(q_4, a) = n$ za $a \in \{208, 212, 240, 244, 248, 252\}$,
$\varphi_6(q_4, a) = q_4$ $\psi_6(q_4, a) = e$ za $a \in \{b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 1\}$,
$\varphi_6(q_4, a) = q_{F_0}$ $\psi_6(q_4, a) = 0$ inače,

$\varphi_6(q_5, a) = q_6$ $\psi_6(q_5, a) = w$ za $a \in \{208, 212, 240, 244\}$,
$\varphi_6(q_5, a) = q_3$ $\psi_6(q_5, a) = w$ za $a \in \{248, 252\}$,
$\varphi_6(q_5, a) = q_7$ $\psi_6(q_5, a) = e$ za $a \in \{74, 78, 202, 94, 206, 218, 106, 110, 234, 126, 238, 250, 210, 242\}$,
$\varphi_6(q_5, a) = q_5$ $\psi_6(q_5, a) = e$ za $a \in \{214, 246, 222, 254\}$,
$\varphi_6(q_5, a) = q_{10}$ $\psi_6(q_5, a) = w$ za $a \in \{120, 124\}$,
$\varphi_6(q_5, a) = q_{F_0}$ $\psi_6(q_5, a) = 0$ inače,

$\varphi_6(q_6, a) = q_6$ $\psi_6(q_6, a) = w$ za $a \in \{214, 246\}$,

$\varphi_6(q_6, a) = q_3 \quad \psi_6(q_6, a) = w$ za $a \in \{222, 254\}$,

$\varphi_6(q_6, a) = q_{F_0} \quad \psi_6(q_6, a) = 0$ inače,

$\varphi_6(q_7, a) = q_7 \quad \psi_6(q_7, a) = e$ za $a \in \{98, 102, 118, 246, 226, 230, 66, 70, 86, 214, 194, 198\}$,

$\varphi_6(q_7, a) = q_8 \quad \psi_6(q_7, a) = w$ za $a \in \{112, 116, 244, 240, 80, 84, 208, 212\}$,

$\varphi_6(q_7, a) = q_{F_0} \quad \psi_6(q_7, a) = 0$ inače,

$\varphi_6(q_8, a) = q_8 \quad \psi_6(q_8, a) = w$ za $a \in \{98, 102, 118, 246, 66, 70, 86, 214, 242, 210, 146\}$,

$\varphi_6(q_8, a) = q_9 \quad \psi_6(q_8, a) = w$ za $a \in \{74, 78, 94, 218, 106, 110, 126, 250, 254, 222\}$,

$\varphi_6(q_8, a) = q_8 \quad \psi_6(q_8, a) = w$ za $a \in \{26, 230, 194, 198\}$,

$\varphi_6(q_8, a) = q_9 \quad \psi_6(q_8, a) = w$ za $a \in \{202, 206, 234, 238\}$,

$\varphi_6(q_8, a) = q_{F_0} \quad \psi_6(q_8, a) = 0$ inače,

$\varphi_6(q_9, a) = q_9 \quad \psi_6(q_9, a) = w$ za $a \in \{255, 223, 215, 251, 219, 211, 71, 79, 111, 107, 75, 67, 214, 66, 210\}$,

$\varphi_6(q_9, a) = q_{11} \quad \psi_6(q_9, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_6(q_9, a) = q_{12} \quad \psi_6(q_9, a) = n$ za $a \in \{13, 19, 27, 146, 147, 155\}$,

$\varphi_6(q_9, a) = q_9 \quad \psi_6(q_9, a) = w$ za $a \in \{203, 207, 194, 195, 235, 239, 198, 199\}$,

$\varphi_6(q_9, a) = q_{F_0} \quad \psi_6(q_9, a) = 0$ inače,

$\varphi_6(q_{10}, a) = q_9 \quad \psi_6(q_9, a) = w$ za $a \in \{211, 67, 210, 66, 255, 223, 70, 71, 107, 75, 215, 111, 79, 219, 251, 214\}$,

$\varphi_6(q_{10}, a) = q_{11} \quad \psi_6(q_{10}, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_6(q_{10}, a) = q_{12} \quad \psi_6(q_{10}, a) = n$ za $a \in \{18, 19, 27, 146, 147, 155\}$,

$\varphi_6(q_{10}, a) = q_{10} \quad \psi_6(q_{10}, a) = w$ za $a \in \{203, 207, 194, 195, 235, 239, 198, 199\}$,

$\varphi_6(q_{10}, a) = q_{F_0} \quad \psi_6(q_{10}, a) = 0$ inače,

$\varphi_6(q_{11}, a) = q_{12} \quad \psi_6(q_{11}, a) = n$ za $a \in \{210, 211, 219, 218, 250, 251, 242\}$,

$\varphi_6(q_{11}, a) = q_{11} \quad \psi_6(q_{11}, a) = e$ za $a \in \{$ b$\in$A$|$ b $= a_0+a_12+a_22^2+a_32^3+a_42^4+a_52^5+a_62^6+a_72^7$, $a_1 = 1\}$,

$\varphi_6(q_{11}, a) = q_{F_0} \quad \psi_6(q_{11}, a) = 0$ inače,

$\varphi_6(q_{12}, a) = q_{12} \quad \psi_6(q_{12}, a) = w$ za $a \in \{214, 66, 194, 210, 248, 104, 232, 203, 215, 211, 67, 195,$ 216, 200, 72, 255, 223, 251, 219, 107, 75, 235, 249, 233, 105, 217, 201, 73$\}$,

$\varphi_6(q_{12}, a) = q_{12} \quad \psi_6(q_{12}, a) = n$ za $a \in \{18, 19, 24, 25, 28, 29, 27, 146, 147, 152, 153, 155\}$,

$\varphi_6(q_{12}, a) = q_{17} \quad \psi_6(q_{12}, a) = e$ za $a = 26$,

$\varphi_6(q_{12}, a) = q_{15} \quad \psi_6(q_{12}, a) = e$ za $a = 30$,

$\varphi_6(q_{12}, a) = q_{14} \quad \psi_6(q_{12}, a) = w$ za $a \in \{253, 221, 220, 252\}$,

$\varphi_6(q_{12}, a) = q_{21} \quad \psi_6(q_{12}, a) = w$ za $a \in \{120, 121, 124, 127\}$,

$\varphi_6(q_{12}, a) = q_{13} \quad \psi_6(q_{12}, a) = e$ za $a \in \{22, 23, 150, 151, 159, 31\}$,

$\varphi_6(q_{12}, a) = q_{F_0} \quad \psi_6(q_{12}, a) = 0$ inače,

$\varphi_6(q_{13}, a) = q_{12} \quad \psi_6(q_{13}, a) = n$ za $a \in \{210, 211, 216, 217, 219, 248, 249, 251\}$,

$\varphi_6(q_{13}, a) = q_{13} \quad \psi_6(q_{13}, a) = e$ za $a \in \{$ b$\in$A$|$ b $= a_0+a_12+a_22^2+a_32^3+a_42^4+a_52^5+a_62^6+a_72^7$, $a_1 = 1\}$,

$\varphi_6(q_{13}, a) = q_{F_0} \quad \psi_6(q_{13}, a) = 0$ inače,

$\varphi_6(q_{14}, a) = q_{14} \quad \psi_6(q_{14}, a) = w$ za $a \in \{214, 215, 223, 255\}$,

$\varphi_6(q_{14}, a) = q_{15} \quad \psi_6(q_{14}, a) = n$ za $a \in \{22, 23, 31\}$,

$\varphi_6(q_{14}, a) = q_{F_0} \quad \psi_6(q_{14}, a) = 0$ inače,

$\varphi_6(q_{15}, a) = q_{15} \quad \psi_6(q_{15}, a) = e$ za $a \in \{31, 214, 246, 254, 255\}$,

$\varphi_6(q_{15}, a) = q_{16} \quad \psi_6(q_{15}, a) = w$ za $a \in \{208, 212, 240, 244, 248, 252\}$,

$\varphi_6(q_{15}, a) = q_{17} \quad \psi_6(q_{15}, a) = e$ za $a \in \{251, 250, 242, 210, 27\}$,

$\varphi_6(q_{15}, a) = q_{23} \quad \psi_6(q_{15}, a) = e$ za $a \in \{211, 215, 243, 247\}$,

$\varphi_6(q_{15}, a) = q_{F_0} \quad \psi_6(q_{15}, a) = 0$ inače,

$\varphi_6(q_{16}, a) = q_{16} \quad \psi_6(q_{16}, a) = w$ za $a \in \{255, 246, 214, 254\}$,

$\varphi_6(q_{16}, a) = q_{15} \quad \psi_6(q_{16}, a) = n$ za $a \in \{30, 31\}$,

$\varphi_6(q_{16}, a) = q_{F_0} \quad \psi_6(q_{16}, a) = 0$ inače,

$\varphi_6(q_{17}, a) = q_{17} \quad \psi_6(q_{17}, a) = e$ za $a \in \{127, 126, 118, 106, 107, 110, 111, 214, 194, 198, 239, 238, 234, 235, 230, 226, 98, 102, 86, 66, 70, 255, 254, 246\}$,

$\varphi_6(q_{17}, a) = q_{18} \quad \psi_6(q_{17}, a) = w$ za $a \in \{240, 244, 208, 212\}$,

$\varphi_6(q_{17}, a) = q_{19} \quad \psi_6(q_{17}, a) = n$ za $a \in \{80, 84, 112, 116, 120, 124\}$,

$\varphi_6(q_{17}, a) = q_{23} \quad \psi_6(q_{17}, a) = e$ za $a \in \{231, 227, 199, 195, 123, 122, 119, 115, 114, 99, 103, 83,$

87, 82, 67, 71, 251, 250, 210, 247, 242, 243, 215, 211},

$\varphi_6(q_{17}, a) = q_{F_0}$ $\psi_6(q_{17}, a) = 0$ inače,

$\varphi_6(q_{18}, a) = q_{19}$ $\psi_6(q_{18}, a) = n$ za $a \in \{86, 126, 127, 118\}$,

$\varphi_6(q_{18}, a) = q_{18}$ $\psi_6(q_{18}, a) = w$ za $a \in \{$ $b \in A|$ $b = a_0+a_12+a_22^2+a_32^3+a_42^4+a_52^5+a_62^6+a_72^7$, $a_6 = 1\}$,

$\varphi_6(q_{18}, a) = q_{F_0}$ $\psi_6(q_{18}, a) = 0$ inače,

$\varphi_6(q_{19}, a) = q_{19}$ $\psi_6(q_{19}, a) = e$ za $a \in \{246, 63, 30, 10, 14, 110, 111, 214, 66, 70, 86, 254, 126, 127, 106, 107, 43, 47, 62, 46, 42, 255, 31, 15, 11, 118, 98, 102\}$,

$\varphi_6(q_{19}, a) = q_{19}$ $\psi_6(q_{19}, a) = n$ za $a \in \{56, 60, 124, 120, 24, 28, 112, 116, 80, 84\}$,

$\varphi_6(q_{19}, a) = q_{20}$ $\psi_6(q_{19}, a) = w$ za $a \in \{208, 212, 240, 244, 248, 252\}$,

$\varphi_6(q_{19}, a) = q_{23}$ $\psi_6(q_{19}, a) = e$ za $a \in \{242, 247, 243, 119, 114, 115, 103, 99, 250, 251, 122, 123, 215, 210, 211, 67, 71, 87, 82, 83\}$,

$\varphi_6(q_{19}, a) = q_{F_0}$ $\psi_6(q_{19}, a) = 0$ inače,

$\varphi_6(q_{20}, a) = q_{19}$ $\psi_6(q_{20}, a) = n$ za $a \in \{30, 31, 62, 63, 86, 118, 126, 127\}$,

$\varphi_6(q_{20}, a) = q_{20}$ $\psi_6(q_{20}, a) = w$ za $a \in \{$ $b \in A|$ $b = a_0+a_12+a_22^2+a_32^3+a_42^4+a_52^5+a_62^6+a_72^7$, $a_6 = 1\}$,

$\varphi_6(q_{20}, a) = q_{F_0}$ $\psi_6(q_{20}, a) = 0$ inače,

$\varphi_6(q_{21}, a) = q_{21}$ $\psi_6(q_{21}, a) = w$ za $a \in \{111, 239, 107, 235, 251, 255\}$,

$\varphi_6(q_{21}, a) = q_{22}$ $\psi_6(q_{21}, a) = e$ za $a \in \{27, 31\}$,

$\varphi_6(q_{21}, a) = q_{F_0}$ $\psi_6(q_{21}, a) = 0$ inače,

$\varphi_6(q_{22}, a) = q_{22}$ $\psi_6(q_{22}, a) = e$ za $a \in \{111, 239, 107, 251, 255, 235\}$,

$\varphi_6(q_{22}, a) = q_{19}$ $\psi_6(q_{22}, a) = n$ za $a \in \{120, 121, 124, 127\}$,

$\varphi_6(q_{22}, a) = q_{F_0}$ $\psi_6(q_{22}, a) = 0$ inače,

$\varphi_6(q_{23}, a) = q_{23}$ $\psi_6(q_{23}, a) = e$ za $a \in \{66, 67, 106, 107, 98, 99, 194, 195, 226, 227, 234, 235\}$,

$\varphi_6(q_{23}, a) = q_{24}$ $\psi_6(q_{23}, a) = s$ za $a \in \{223, 219, 216, 217, 200, 201, 203, 91, 95, 75, 79, 72, 73\}$,

$\varphi_6(q_{23}, a) = q_{F_0}$ $\psi_6(q_{23}, a) = 0$ inače,

$\varphi_6(q_{24}, a) = q_{24}$ $\psi_6(q_{24}, a) = e$ za $a \in \{107, 66, 67, 75, 31, 22, 23, 235, 203, 194, 195, 27, 18, 19, 255, 251, 223, 219, 214, 210, 215, 211, 159, 151, 150, 155, 146, 147\}$,

$\varphi_6(q_{24}, a) = q_{24}$ $\psi_6(q_{24}, a) = s$ za $a \in \{24, 25, 72, 73, 152, 153, 216, 217, 200, 201, 184, 56\}$,

$\varphi_6(q_{24}, a) = q_{25}$ $\psi_6(q_{24}, a) = w$ za $a \in \{104, 105, 232, 233, 248, 249\}$,

$\varphi_6(q_{24}, a) = q_{26}$ $\psi_6(q_{24}, a) = e$ za $a \in \{154, 158, 30, 62, 63, 59, 58, 26, 254, 250, 186, 187, 190, 191\}$,

$\varphi_6(q_{24}, a) = q_{28}$ $\psi_6(q_{24}, a) = w$ za $a \in \{80, 112, 120\}$,

$\varphi_6(q_{24}, a) = q_{F_0}$ $\psi_6(q_{24}, a) = 0$ inače,

$\varphi_6(q_{25}, a) = q_{24}$ $\psi_6(q_{25}, a) = s$ za $a \in \{223, 219, 203, 75, 31, 159, 27, 155\}$,

$\varphi_6(q_{25}, a) = q_{25}$ $\psi_6(q_{25}, a) = w$ za $a \in \{$ $b \in A|$ $b = a_0+a_12+a_22^2+a_32^3+a_42^4+a_52^5+a_62^6+a_72^7$, $a_6 = 1\}$,

$\varphi_6(q_{25}, a) = q_{F_0}$ $\psi_6(q_{25}, a) = 0$ inače,

$\varphi_6(q_{26}, a) = q_{26}$ $\psi_6(q_{26}, a) = e$ za $a \in \{235, 246, 214, 251, 254, 255, 250, 107\}$,

$\varphi_6(q_{26}, a) = q_{27}$ $\psi_6(q_{26}, a) = w$ za $a \in \{208, 212, 224, 240, 244\}$,

$\varphi_6(q_{26}, a) = q_{28}$ $\psi_6(q_{26}, a) = s$ za $a \in \{104, 232, 248, 252\}$,

$\varphi_6(q_{26}, a) = q_{F_0}$ $\psi_6(q_{26}, a) = 0$ inače,

$\varphi_6(q_{27}, a) = q_{28}$ $\psi_6(q_{27}, a) = s$ za $a \in \{154, 158, 30, 62, 58, 26, 254, 250, 186, 190\}$,

$\varphi_6(q_{27}, a) = q_{27}$ $\psi_6(q_{27}, a) = w$ za $a \in \{$ $b \in A|$ $b = a_0+a_12+a_22^2+a_32^3+a_42^4+a_52^5+a_62^6+a_72^7$, $a_6 = 1\}$,

$\varphi_6(q_{27}, a) = q_{F_0}$ $\psi_6(q_{27}, a) = 0$ inače,

$\varphi_6(q_{28}, a) = q_{28}$ $\psi_6(q_{28}, a) = w$ za $a \in \{246, 66, 98, 120, 80, 112, 106, 107, 255, 127, 254, 126, 214, 86, 118, 248, 240, 208, 70, 102, 110, 124, 116, 84, 252, 244, 212, 111\}$,

$\varphi_6(q_{28}, a) = q_{28}$ $\psi_6(q_{28}, a) = s$ za $a \in \{14, 46, 28, 60, 62, 30, 24, 56, 10, 42\}$,

$\varphi_6(q_{28}, a) = q_{29}$ $\psi_6(q_{28}, a) = e$ za $a \in \{11, 15, 31, 43, 47, 63\}$,

$\varphi_6(q_{28}, a) = q_{30}$ $\psi_6(q_{28}, a) = w$ za $a \in \{222, 78, 95, 223, 94, 74, 79, 75\}$,

$\varphi_6(q_{28}, a) = q_{31}$ $\psi_6(q_{28}, a) = e$ za $a \in \{235, 203, 226, 194, 202, 234, 198, 230, 206, 238, 207, 239\}$,

$\varphi_6(q_{28}, a) = q_{F_0}$ $\psi_6(q_{28}, a) = 0$ inače,

$\varphi_6(q_{29}, a) = q_{28}$ $\psi_6(q_{29}, a) = s$ za $a \in \{126, 120, 106, 124, 252, 248, 110, 254\}$,

$\varphi_6(q_{29}, a) = q_{29}$ $\psi_6(q_{29}, a) = e$ za $a \in \{$ $b \in A|$ $b = a_0+a_12+a_22^2+a_32^3+a_42^4+a_52^5+a_62^6+a_72^7$, $a_1 = 1\}$,

$\varphi_6(q_{29}, a) = q_{F_0}$ $\psi_6(q_{29}, a) = 0$ inače,

$\varphi_6(q_{30}, a) = q_{30}$ $\psi_6(q_{30}, a) = w$ za $a\in\{215, 87, 67, 71, 214, 86, 70, 66\}$,
$\varphi_6(q_{30}, a) = q_{31}$ $\psi_6(q_{30}, a) = e$ za $a\in\{194, 195, 198, 199\}$,
$\varphi_6(q_{30}, a) = q_{F_0}$ $\psi_6(q_{30}, a) = 0$ inače,

$\varphi_6(q_{31}, a) = q_{31}$ $\psi_6(q_{31}, a) = e$ za $a\in\{ b\in A| b = a_0+a_12+a_22^2+a_32^3+a_42^4+a_52^5+a_62^6+a_72^7$, $a_1 = 1$, $a_4 = 0\}$,
$\varphi_6(q_{31}, a) = q_{31}$ $\psi_6(q_{31}, a) = n$ za $a\in\{ b\in A| 24\leq b\leq31$ ili $56\leq b\leq63$ ili $80\leq b\leq95$ ili $112\leq b\leq127\}$,
$\varphi_6(q_{31}, a) = q_{32}$ $\psi_6(q_{31}, a) = n$ za $a\in\{b\in A| 144\leq b\leq159$ ili $184\leq b\leq191\}$,
$\varphi_6(q_{31}, a) = q_{F_0}$ $\psi_6(q_{31}, a) = 0$ inače,

$\varphi_6(q_{32}, a) = q_{32}$ $\psi_6(q_{32}, a) = w$ za $a\in\{ b\in A| 64\leq b\leq103$ ili $112\leq b\leq119$ ili $192\leq b\leq231$ ili $240\leq b\leq247\}$,
$\varphi_6(q_{32}, a) = q_{32}$ $\psi_6(q_{32}, a) = n$ za $a\in\{ b\in A| 16\leq b\leq29$ ili $b = 31$ ili $144\leq b\leq159\}$,
$\varphi_6(q_{32}, a) = q_{33}$ $\psi_6(q_{32}, a) = w$ za $a = 254$,
$\varphi_6(q_{32}, a) = q_{35}$ $\psi_6(q_{32}, a) = e$ za $a = 30$,
$\varphi_6(q_{32}, a) = q_{38}$ $\psi_6(q_{32}, a) = w$ za $a\in\{110, 122, 126, 238\}$,
$\varphi_6(q_{32}, a) = q_{39}$ $\psi_6(q_{32}, a) = w$ za $a\in\{106, 234, 250\}$,
$\varphi_6(q_{32}, a) = q_{40}$ $\psi_6(q_{32}, a) = e$ za $a = 26$,
$\varphi_6(q_{32}, a) = q_{49}$ $\psi_6(q_{32}, a) = e$ za $a\in\{10, 42\}$,
$\varphi_6(q_{32}, a) = q_{47}$ $\psi_6(q_{32}, a) = e$ za $a\in\{14, 46, 62\}$,
$\varphi_6(q_{32}, a) = q_{F_0}$ $\psi_6(q_{32}, a) = 0$ inače,

$\varphi_6(q_{33}, a) = q_{33}$ $\psi_6(q_{33}, a) = w$ za $a = 255$,
$\varphi_6(q_{33}, a) = q_{34}$ $\psi_6(q_{33}, a) = e$ za $a = 31$,
$\varphi_6(q_{33}, a) = q_{38}$ $\psi_6(q_{33}, a) = w$ za $a = 127$,
$\varphi_6(q_{33}, a) = q_{F_0}$ $\psi_6(q_{33}, a) = 0$ inače,

$\varphi_6(q_{34}, a) = q_{34}$ $\psi_6(q_{34}, a) = e$ za $a = 255$,
$\varphi_6(q_{34}, a) = q_{35}$ $\psi_6(q_{34}, a) = e$ za $a = 254$,
$\varphi_6(q_{34}, a) = q_{F_0}$ $\psi_6(q_{34}, a) = 0$ inače,

$\varphi_6(q_{35}, a) = q_{35}$ $\psi_6(q_{35}, a) = e$ za $a\in\{246, 247, 214, 215, 223, 255\}$,
$\varphi_6(q_{35}, a) = q_{36}$ $\psi_6(q_{35}, a) = n$ za $a\in\{216, 217, 248, 249\}$,
$\varphi_6(q_{35}, a) = q_{43}$ $\psi_6(q_{35}, a) = e$ za $a\in\{242, 243, 219, 210, 211, 251\}$,

$\varphi_6(q_{35}, a) = q_{F_0}$ $\psi_6(q_{35}, a) = 0$ inače,

$\varphi_6(q_{36}, a) = q_{36}$ $\psi_6(q_{36}, a) = w$ za $a\in\{105, 233, 249, 248, 232, 104, 107, 235, 251, 255\}$,
$\varphi_6(q_{36}, a) = q_{60}$ $\psi_6(q_{36}, a) = n$ za $a = 27$,
$\varphi_6(q_{36}, a) = q_{59}$ $\psi_6(q_{36}, a) = s$ za $a\in\{11, 43\}$,
$\varphi_6(q_{36}, a) = q_{37}$ $\psi_6(q_{36}, a) = e$ za $a = 31$,
$\varphi_6(q_{36}, a) = q_{60}$ $\psi_6(q_{36}, a) = w$ za $a\in\{121, 125, 253\}$,
$\varphi_6(q_{36}, a) = q_{41}$ $\psi_6(q_{36}, a) = s$ za $a\in\{120, 124, 252\}$,
$\varphi_6(q_{36}, a) = q_{45}$ $\psi_6(q_{36}, a) = w$ za $a\in\{123, 127\}$,
$\varphi_6(q_{36}, a) = q_{F_0}$ $\psi_6(q_{36}, a) = 0$ inače,

$\varphi_6(q_{37}, a) = q_{37}$ $\psi_6(q_{37}, a) = e$ za $a = 255$,
$\varphi_6(q_{37}, a) = q_{36}$ $\psi_6(q_{37}, a) = n$ za $a\in\{248, 251, 249\}$,
$\varphi_6(q_{37}, a) = q_{F_0}$ $\psi_6(q_{37}, a) = 0$ inače,

$\varphi_6(q_{38}, a) = q_{38}$ $\psi_6(q_{38}, a) = w$ za $a\in\{235, 239, 251, 255, 111, 107\}$,
$\varphi_6(q_{38}, a) = q_{49}$ $\psi_6(q_{38}, a) = e$ za $a\in\{11, 43\}$,
$\varphi_6(q_{38}, a) = q_{47}$ $\psi_6(q_{38}, a) = e$ za $a\in\{15, 47\}$,
$\varphi_6(q_{38}, a) = q_{40}$ $\psi_6(q_{38}, a) = e$ za $a\in\{27, 31\}$,
$\varphi_6(q_{38}, a) = q_{F_0}$ $\psi_6(q_{38}, a) = 0$ inače,

$\varphi_6(q_{39}, a) = q_{39}$ $\psi_6(q_{39}, a) = w$ za $a\in\{107, 235, 251, 255\}$,
$\varphi_6(q_{39}, a) = q_{38}$ $\psi_6(q_{39}, a) = w$ za $a\in\{127, 123\}$,
$\varphi_6(q_{39}, a) = q_{49}$ $\psi_6(q_{39}, a) = e$ za $a = 11$,
$\varphi_6(q_{39}, a) = q_{40}$ $\psi_6(q_{39}, a) = e$ za $a\in\{27, 31\}$,
$\varphi_6(q_{39}, a) = q_{F_0}$ $\psi_6(q_{39}, a) = 0$ inače,

$\varphi_6(q_{40}, a) = q_{40}$ $\psi_6(q_{40}, a) = e$ za $a\in\{255, 251, 234, 235, 106, 107, 250\}$,
$\varphi_6(q_{40}, a) = q_{49}$ $\psi_6(q_{40}, a) = e$ za $a\in\{98, 99, 226, 227\}$,
$\varphi_6(q_{40}, a) = q_{47}$ $\psi_6(q_{40}, a) = e$ za $a\in\{110, 238, 111, 239, 102, 103, 230, 231\}$,
$\varphi_6(q_{40}, a) = q_{F_0}$ $\psi_6(q_{40}, a) = 0$ inače,

$\varphi_6(q_{41}, a) = q_{41}$ $\psi_6(q_{41}, a) = s$ za $a = 248$,
$\varphi_6(q_{41}, a) = q_{42}$ $\psi_6(q_{41}, a) = n$ za $a = 249$,
$\varphi_6(q_{41}, a) = q_{F_0}$ $\psi_6(q_{41}, a) = 0$ inače,

$\varphi_6(q_{42}, a) = q_{42}$ $\psi_6(q_{42}, a) = n$ za $a = 248$,
$\varphi_6(q_{42}, a) = q_{60}$ $\psi_6(q_{42}, a) = w$ za $a\in\{120, 124, 252\}$,

$\varphi_6(q_{42}, a) = q_{F_0}$ $\psi_6(q_{42}, a) = 0$ inače,

$\varphi_6(q_{43}, a) = q_{43}$ $\psi_6(q_{43}, a) = e$ za $a \in \{194, 195, 66, 67, 107, 75, 235, 203\}$,

$\varphi_6(q_{43}, a) = q_{44}$ $\psi_6(q_{43}, a) = w$ za $a \in \{72, 73, 200, 201, 232, 233, 104, 105\}$,

$\varphi_6(q_{43}, a) = q_{50}$ $\psi_6(q_{43}, a) = e$ za $a \in \{79, 207\}$,

$\varphi_6(q_{43}, a) = q_{47}$ $\psi_6(q_{43}, a) = e$ za $a \in \{70, 239, 198, 199, 111, 71\}$,

$\varphi_6(q_{43}, a) = q_{F_0}$ $\psi_6(q_{43}, a) = 0$ inače,

$\varphi_6(q_{44}, a) = q_{36}$ $\psi_6(q_{44}, a) = n$ za $a \in \{242, 243, 210, 211, 219, 251\}$,

$\varphi_6(q_{44}, a) = q_{44}$ $\psi_6(q_{44}, a) = w$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_6 = 1\}$,

$\varphi_6(q_{44}, a) = q_{F_0}$ $\psi_6(q_{44}, a) = 0$ inače,

$\varphi_6(q_{45}, a) = q_{45}$ $\psi_6(q_{45}, a) = w$ za $a \in \{111, 107, 239, 235, 251, 255\}$,

$\varphi_6(q_{45}, a) = q_{46}$ $\psi_6(q_{45}, a) = e$ za $a \in \{27, 31\}$,

$\varphi_6(q_{45}, a) = q_{58}$ $\psi_6(q_{45}, a) = e$ za $a \in \{11, 15\}$,

$\varphi_6(q_{45}, a) = q_{F_0}$ $\psi_6(q_{45}, a) = 0$ inače,

$\varphi_6(q_{46}, a) = q_{46}$ $\psi_6(q_{46}, a) = e$ za $a \in \{251, 255\}$,

$\varphi_6(q_{46}, a) = q_{58}$ $\psi_6(q_{46}, a) = e$ za $a \in \{239, 235\}$,

$\varphi_6(q_{46}, a) = q_{F_0}$ $\psi_6(q_{46}, a) = 0$ inače,

$\varphi_6(q_{47}, a) = q_{47}$ $\psi_6(q_{47}, a) = e$ za $a \in \{254, 255, 246, 247, 214, 215, 126, 127, 118, 119, 86, 87\}$,

$\varphi_6(q_{47}, a) = q_{48}$ $\psi_6(q_{47}, a) = e$ za $a \in \{122, 123, 114, 115, 82, 83, 250, 251, 242, 243, 210, 211\}$,

$\varphi_6(q_{47}, a) = q_{50}$ $\psi_6(q_{47}, a) = e$ za $a \in \{95, 223\}$,

$\varphi_6(q_{47}, a) = q_{51}$ $\psi_6(q_{47}, a) = e$ za $a \in \{91, 219\}$,

$\varphi_6(q_{47}, a) = q_{55}$ $\psi_6(q_{47}, a) = n$ za $a \in \{216, 217\}$,

$\varphi_6(q_{47}, a) = q_{F_0}$ $\psi_6(q_{47}, a) = 0$ inače,

$\varphi_6(q_{48}, a) = q_{48}$ $\psi_6(q_{48}, a) = e$ za $a \in \{234, 235, 226, 227, 194, 195, 106, 107, 98, 99, 66, 67\}$,

$\varphi_6(q_{48}, a) = q_{51}$ $\psi_6(q_{48}, a) = e$ za $a \in \{203, 75\}$,

$\varphi_6(q_{48}, a) = q_{54}$ $\psi_6(q_{48}, a) = w$ za $a \in \{200, 201, 72, 73\}$,

$\varphi_6(q_{48}, a) = q_{F_0}$ $\psi_6(q_{48}, a) = 0$ inače,

$\varphi_6(q_{49}, a) = q_{49}$ $\psi_6(q_{49}, a) = e$ za $a \in \{66, 67, 98, 99, 106, 107\}$,

$\varphi_6(q_{49}, a) = q_{47}$ $\psi_6(q_{49}, a) = e$ za $a \in \{110, 111, 102, 103, 70, 71\}$,

$\varphi_6(q_{49}, a) = q_{59}$ $\psi_6(q_{49}, a) = w$ za $a \in \{72, 73\}$,

$\varphi_6(q_{49}, a) = q_{50}$ $\psi_6(q_{49}, a) = e$ za $a = 79$,

$\varphi_6(q_{49}, a) = q_{52}$ $\psi_6(q_{49}, a) = e$ za $a = 75$,

$\varphi_6(q_{49}, a) = q_{F_0}$ $\psi_6(q_{49}, a) = 0$ inače,

$\varphi_6(q_{50}, a) = q_{55}$ $\psi_6(q_{50}, a) = n$ za $a \in \{248, 249\}$,

$\varphi_6(q_{50}, a) = q_{50}$ $\psi_6(q_{50}, a) = e$ za $a \in \{127, 255\}$,

$\varphi_6(q_{50}, a) = q_{51}$ $\psi_6(q_{50}, a) = e$ za $a \in \{123, 251\}$,

$\varphi_6(q_{50}, a) = q_{F_0}$ $\psi_6(q_{50}, a) = 0$ inače,

$\varphi_6(q_{51}, a) = q_{54}$ $\psi_6(q_{51}, a) = w$ za $a \in \{72, 73, 104, 105, 232, 233\}$,

$\varphi_6(q_{51}, a) = q_{51}$ $\psi_6(q_{51}, a) = e$ za $a \in \{107, 235\}$,

$\varphi_6(q_{51}, a) = q_{F_0}$ $\psi_6(q_{51}, a) = 0$ inače,

$\varphi_6(q_{52}, a) = q_{59}$ $\psi_6(q_{52}, a) = w$ za $a \in \{104, 105\}$,

$\varphi_6(q_{52}, a) = q_{52}$ $\psi_6(q_{52}, a) = e$ za $a = 107$,

$\varphi_6(q_{52}, a) = q_{53}$ $\psi_6(q_{52}, a) = e$ za $a = 111$,

$\varphi_6(q_{52}, a) = q_{F_0}$ $\psi_6(q_{52}, a) = 0$ inače,

$\varphi_6(q_{53}, a) = q_{53}$ $\psi_6(q_{53}, a) = e$ za $a \in \{127, 255\}$,

$\varphi_6(q_{53}, a) = q_{55}$ $\psi_6(q_{53}, a) = n$ za $a \in \{248, 249\}$,

$\varphi_6(q_{53}, a) = q_{51}$ $\psi_6(q_{53}, a) = e$ za $a \in \{123, 251\}$,

$\varphi_6(q_{53}, a) = q_{F_0}$ $\psi_6(q_{53}, a) = 0$ inače.

$\varphi_6(q_{54}, a) = q_{55}$ $\psi_6(q_{54}, a) = n$ za $a \in \{210, 114, 115, 122, 123, 82, 242, 243, 250, 251, 219, 83, 211, 91\}$,

$\varphi_6(q_{54}, a) = q_{41}$ $\psi_6(q_{54}, a) = s$ za $a \in \{120, 124, 252\}$,

$\varphi_6(q_{54}, a) = q_{60}$ $\psi_6(q_{54}, a) = w$ za $a \in \{121, 125, 253\}$,

$\varphi_6(q_{54}, a) = q_{54}$ $\psi_6(q_{54}, a) = w$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_6 = 1\}$,

$\varphi_6(q_{54}, a) = q_{F_0}$ $\psi_6(q_{54}, a) = 0$ inače,

$\varphi_6(q_{55}, a) = q_{55}$ $\psi_6(q_{55}, a) = n$ za $a = 123$,

$\varphi_6(q_{55}, a) = q_{55}$ $\psi_6(q_{55}, a) = w$ za $a \in \{104, 105, 107, 232, 233, 235\}$,

$\varphi_6(q_{55}, a) = q_{56}$ $\psi_6(q_{55}, a) = w$ za $a \in \{248, 249, 251\}$,

$\varphi_6(q_{55}, a) = q_{59}$ $\psi_6(q_{55}, a) = s$ za $a \in \{11, 43, 41\}$,

$\varphi_6(q_{55}, a) = q_{41}$ $\psi_6(q_{55}, a) = s$ za $a \in \{120, 124, 252\}$,

$\varphi_6(q_{55}, a) = q_{60}$ $\psi_6(q_{55}, a) = w$ za $a \in \{121, 125, 253\}$,

$\varphi_6(q_{55}, a) = q_{F_0}$ $\psi_6(q_{55}, a) = 0$ inače,

$\varphi_6(q_{56}, a) = q_{56}$ $\psi_6(q_{56}, a) = w$ za $a = 255$,

$\varphi_6(q_{56}, a) = q_{58}$ $\psi_6(q_{56}, a) = e$ za $a \in \{31, 63\}$,

$\varphi_6(q_{56}, a) = q_{57}$ $\psi_6(q_{56}, a) = w$ za $a = 127$,

$\varphi_6(q_{56}, a) = q_{F_0}$ $\psi_6(q_{56}, a) = 0$ inače,

$\varphi_6(q_{57}, a) = q_{57}$ $\psi_6(q_{57}, a) = w$ za $a \in \{107, 111\}$,
$\varphi_6(q_{57}, a) = q_{58}$ $\psi_6(q_{57}, a) = e$ za $a \in \{11, 15, 43, 47\}$,
$\varphi_6(q_{57}, a) = q_{F_0}$ $\psi_6(q_{57}, a) = 0$ inače,

$\varphi_6(q_{58}, a) = q_{55}$ $\psi_6(q_{58}, a) = n$ za $a \in \{248, 249, 251, 123\}$,
$\varphi_6(q_{58}, a) = q_{58}$ $\psi_6(q_{58}, a) = e$ za $a \in \{ b \in A |\ b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_1 = 1\}$,
$\varphi_6(q_{58}, a) = q_{F_0}$ $\psi_6(q_{58}, a) = 0$ inače,

$\varphi_6(q_{59}, a) = q_{60}$ $\psi_6(q_{59}, a) = w$ za $a \in \{235, 239, 234, 238, 227, 231, 203, 207, 226, 230, 195, 199, 194, 198\}$,
$\varphi_6(q_{59}, a) = q_{59}$ $\psi_6(q_{59}, a) = w$ za $a \in \{ b \in A |\ b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_6 = 1, a_7 = 0\}$,
$\varphi_6(q_{59}, a) = q_{59}$ $\psi_6(q_{59}, a) = s$ za $a \in \{ b \in A |\ b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_3 = 1, a_6 = 0\}$,
$\varphi_6(q_{59}, a) = q_{F_0}$ $\psi_6(q_{59}, a) = 0$ inače.

$\varphi_6(q_{60}, a) = q_{60}$ $\psi_6(q_{60}, a) = w$ za $a \in \{249, 121, 253, 127, 255, 125, 111, 107\}$,
$\varphi_6(q_{60}, a) = q_{61}$ $\psi_6(q_{60}, a) = e$ za $a \in \{11, 15, 43, 47\}$,
$\varphi_6(q_{60}, a) = q_{62}$ $\psi_6(q_{60}, a) = n$ za $a \in \{31, 25, 29, 63, 120, 124\}$,
$\varphi_6(q_{60}, a) = q_{60}$ $\psi_6(q_{60}, a) = n$ za $a \in \{211, 243, 210, 242, 251, 219, 26, 250, 27\}$,
$\varphi_6(q_{60}, a) = q_{F_0}$ $\psi_6(q_{60}, a) = 0$ inače,

$\varphi_6(q_{61}, a) = q_{61}$ $\psi_6(q_{61}, a) = e$ za $a \in \{111, 107\}$,
$\varphi_6(q_{61}, a) = q_{62}$ $\psi_6(q_{61}, a) = n$ za $a \in \{120, 121, 124, 125, 127\}$,
$\varphi_6(q_{61}, a) = q_{F_0}$ $\psi_6(q_{61}, a) = 0$ inače,

$\varphi_6(q_{62}, a) = q_{62}$ $\psi_6(q_{62}, a) = e$ za $a \in \{246, 118, 98, 102, 214, 66, 70, 86, 30, 14, 10, 255, 254, 127, 126, 107, 106, 110, 111, 31, 15, 11, 63, 47, 43, 62, 46, 42\}$,
$\varphi_6(q_{62}, a) = q_{62}$ $\psi_6(q_{62}, a) = n$ za $a \in \{120, 112, 116, 124, 60, 56, 24, 28, 80, 84\}$,
$\varphi_6(q_{62}, a) = q_{63}$ $\psi_6(q_{62}, a) = w$ za $a \in \{208, 212, 248, 240, 244, 252\}$,
$\varphi_6(q_{62}, a) = q_{64}$ $\psi_6(q_{62}, a) = e$ za $a \in \{251, 250, 123, 122, 242, 243, 247, 114, 115, 119, 99, 103, 210, 211, 215, 67, 71, 82, 83, 87\}$,

$\varphi_6(q_{62}, a) = q_{F_0}$ $\psi_6(q_{62}, a) = 0$ inače,

$\varphi_6(q_{63}, a) = q_{62}$ $\psi_6(q_{63}, a) = n$ za $a \in \{127, 126, 118, 86, 31, 63, 62, 30\}$,
$\varphi_6(q_{63}, a) = q_{63}$ $\psi_6(q_{63}, a) = w$ za $a \in \{ b \in A |\ b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_6 = 1, \}$,
$\varphi_6(q_{63}, a) = q_{F_0}$ $\psi_6(q_{63}, a) = 0$ inače,

$\varphi_6(q_{64}, a) = q_{64}$ $\psi_6(q_{64}, a) = e$ za $a \in \{234, 235, 226, 227, 194, 195, 107, 106, 98, 99, 66, 67\}$,
$\varphi_6(q_{64}, a) = q_{65}$ $\psi_6(q_{64}, a) = s$ za $a \in \{91, 95, 75, 79, 72, 73, 223, 219, 216, 217, 203, 201, 200\}$,
$\varphi_6(q_{64}, a) = q_{F_0}$ $\psi_6(q_{64}, a) = 0$ inače,

$\varphi_6(q_{65}, a) = q_{65}$ $\psi_6(q_{65}, a) = e$ za $a \in \{107, 66, 67, 75, 31, 22, 23, 235, 203, 194, 195, 27, 18, 19, 255, 251, 223, 219, 214, 210, 215, 211, 159, 151, 150, 155, 146, 147\}$,
$\varphi_6(q_{65}, a) = q_{65}$ $\psi_6(q_{65}, a) = s$ za $a \in \{152, 153, 216, 217, 200, 201, 24, 25, 72, 73, 56, 184\}$,
$\varphi_6(q_{65}, a) = q_{66}$ $\psi_6(q_{65}, a) = w$ za $a \in \{248, 249, 232, 233, 104, 105\}$,
$\varphi_6(q_{65}, a) = q_{67}$ $\psi_6(q_{65}, a) = w$ za $a \in \{64, 192, 208\}$,
$\varphi_6(q_{65}, a) = q_{67}$ $\psi_6(q_{65}, a) = n$ za $a \in \{16, 144\}$,
$\varphi_6(q_{65}, a) = q_{F_0}$ $\psi_6(q_{65}, a) = 0$ inače,

$\varphi_6(q_{66}, a) = q_{65}$ $\psi_6(q_{66}, a) = s$ za $a \in \{223, 219, 203, 75, 31, 159, 27, 155\}$,
$\varphi_6(q_{66}, a) = q_{66}$ $\psi_6(q_{66}, a) = w$ za $a \in \{ b \in A |\ b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_6 = 1, \}$,
$\varphi_6(q_{66}, a) = q_{F_0}$ $\psi_6(q_{66}, a) = 0$ inače,

$\varphi_6(q_{67}, a) = q_{68}$ $\psi_6(q_{67}, a) = w$ za $a \in \{254, 110, 126, 106, 122, 234, 250\}$,
$\varphi_6(q_{67}, a) = q_{69}$ $\psi_6(q_{67}, a) = e$ za $a \in \{30, 62, 14, 46\}$,
$\varphi_6(q_{67}, a) = q_{71}$ $\psi_6(q_{67}, a) = e$ za $a \in \{10, 42\}$,
$\varphi_6(q_{67}, a) = q_{67}$ $\psi_6(q_{67}, a) = n$ za $a \in \{ b \in A |\ b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_6 = 0, a_4 = 1 \}$,
$\varphi_6(q_{67}, a) = q_{67}$ $\psi_6(q_{67}, a) = w$ za $a \in \{ b \in A |\ b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_6 = 1\}$,
$\varphi_6(q_{67}, a) = q_{F_0}$ $\psi_6(q_{67}, a) = 0$ inače,

$\varphi_6(q_{68}, a) = q_{68}$ $\psi_6(q_{68}, a) = w$ za $a \in \{107, 111, 127, 123, 235, 251, 255\}$,

$\varphi_6(q_{68}, a) = q_{69}$ $\psi_6(q_{68}, a) = e$ za $a \in \{15, 31, 63, 47\}$,
$\varphi_6(q_{68}, a) = q_{71}$ $\psi_6(q_{68}, a) = e$ za $a \in \{11, 43\}$,
$\varphi_6(q_{68}, a) = q_{F_0}$ $\psi_6(q_{68}, a) = 0$ inače,

$\varphi_6(q_{69}, a) = q_{69}$ $\psi_6(q_{69}, a) = e$ za $a \in \{254, 255, 246, 247, 214, 215, 126, 127, 118, 119, 86, 87\}$,
$\varphi_6(q_{69}, a) = q_{70}$ $\psi_6(q_{69}, a) = e$ za $a \in \{122, 123, 114, 115, 82, 83, 250, 251, 242, 243, 210, 211\}$,
$\varphi_6(q_{69}, a) = q_{72}$ $\psi_6(q_{69}, a) = e$ za $a \in \{95, 223\}$,
$\varphi_6(q_{69}, a) = q_{73}$ $\psi_6(q_{69}, a) = e$ za $a \in \{91, 219\}$,
$\varphi_6(q_{69}, a) = q_{77}$ $\psi_6(q_{69}, a) = n$ za $a \in \{216, 217\}$,
$\varphi_6(q_{69}, a) = q_{F_0}$ $\psi_6(q_{69}, a) = 0$ inače,

$\varphi_6(q_{70}, a) = q_{70}$ $\psi_6(q_{70}, a) = e$ za $a \in \{234, 235, 226, 227, 194, 195, 106, 107, 98, 99, 66, 67\}$,
$\varphi_6(q_{70}, a) = q_{73}$ $\psi_6(q_{70}, a) = e$ za $a \in \{203, 75\}$,
$\varphi_6(q_{70}, a) = q_{76}$ $\psi_6(q_{70}, a) = w$ za $a \in \{200, 201\}$,
$\varphi_6(q_{70}, a) = q_{F_0}$ $\psi_6(q_{70}, a) = 0$ inače,

$\varphi_6(q_{71}, a) = q_{71}$ $\psi_6(q_{71}, a) = e$ za $a \in \{66, 67, 98, 99, 106, 107\}$,
$\varphi_6(q_{71}, a) = q_{69}$ $\psi_6(q_{71}, a) = e$ za $a \in \{110, 111, 102, 103, 70, 71\}$,
$\varphi_6(q_{71}, a) = q_{F_1}$ $\psi_6(q_{71}, a) = 0$ za $a \in \{72, 73\}$,
$\varphi_6(q_{71}, a) = q_{72}$ $\psi_6(q_{71}, a) = e$ za $a = 79$,
$\varphi_6(q_{71}, a) = q_{74}$ $\psi_6(q_{71}, a) = e$ za $a = 75$,
$\varphi_6(q_{71}, a) = q_{F_0}$ $\psi_6(q_{71}, a) = 0$ inače,

$\varphi_6(q_{72}, a) = q_{77}$ $\psi_6(q_{72}, a) = n$ za $a \in \{248, 249\}$,
$\varphi_6(q_{72}, a) = q_{72}$ $\psi_6(q_{72}, a) = e$ za $a \in \{127, 255\}$,
$\varphi_6(q_{72}, a) = q_{73}$ $\psi_6(q_{72}, a) = e$ za $a \in \{123, 251\}$,
$\varphi_6(q_{72}, a) = q_{F_0}$ $\psi_6(q_{72}, a) = 0$ inače,

$\varphi_6(q_{73}, a) = q_{76}$ $\psi_6(q_{73}, a) = w$ za $a \in \{72, 73, 104, 105, 232, 233\}$,
$\varphi_6(q_{73}, a) = q_{73}$ $\psi_6(q_{73}, a) = e$ za $a \in \{107, 235\}$,
$\varphi_6(q_{73}, a) = q_{F_0}$ $\psi_6(q_{73}, a) = 0$ inače,

$\varphi_6(q_{74}, a) = q_{F_1}$ $\psi_6(q_{74}, a) = 0$ za $a \in \{104, 105\}$,
$\varphi_6(q_{74}, a) = q_{74}$ $\psi_6(q_{74}, a) = e$ za $a = 107$,
$\varphi_6(q_{74}, a) = q_{75}$ $\psi_6(q_{74}, a) = e$ za $a = 111$,
$\varphi_6(q_{74}, a) = q_{F_0}$ $\psi_6(q_{74}, a) = 0$ inače,

$\varphi_6(q_{75}, a) = q_{75}$ $\psi_6(q_{75}, a) = e$ za $a \in \{127, 255\}$,
$\varphi_6(q_{75}, a) = q_{77}$ $\psi_6(q_{75}, a) = n$ za $a \in \{248, 249\}$,
$\varphi_6(q_{75}, a) = q_{73}$ $\psi_6(q_{75}, a) = e$ za $a \in \{123, 251\}$,
$\varphi_6(q_{75}, a) = q_{F_0}$ $\psi_6(q_{75}, a) = 0$ inače.

$\varphi_6(q_{76}, a) = q_{77}$ $\psi_6(q_{76}, a) = n$ za $a \in \{210, 114, 115, 122, 123, 82, 242, 243, 250, 251, 219, 83, 211, 91\}$,
$\varphi_6(q_{76}, a) = q_{76}$ $\psi_6(q_{76}, a) = w$ za $a \in \{ b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_6 = 1\}$,
$\varphi_6(q_{76}, a) = q_{F_0}$ $\psi_6(q_{76}, a) = 0$ inače,

$\varphi_6(q_{77}, a) = q_{77}$ $\psi_6(q_{77}, a) = n$ za $a = 123$,
$\varphi_6(q_{77}, a) = q_{77}$ $\psi_6(q_{77}, a) = w$ za $a \in \{104, 105, 107, 232, 233, 235\}$,
$\varphi_6(q_{77}, a) = q_{78}$ $\psi_6(q_{77}, a) = w$ za $a \in \{248, 249, 251\}$,
$\varphi_6(q_{77}, a) = q_{81}$ $\psi_6(q_{77}, a) = s$ za $a = 41$,
$\varphi_6(q_{77}, a) = q_{F_1}$ $\psi_6(q_{77}, a) = 0$ za $a \in \{11, 43\}$,
$\varphi_6(q_{77}, a) = q_{F_0}$ $\psi_6(q_{77}, a) = 0$ inače,

$\varphi_6(q_{78}, a) = q_{78}$ $\psi_6(q_{78}, a) = w$ za $a = 255$,
$\varphi_6(q_{78}, a) = q_{80}$ $\psi_6(q_{78}, a) = e$ za $a \in \{31, 63\}$,
$\varphi_6(q_{78}, a) = q_{79}$ $\psi_6(q_{78}, a) = w$ za $a = 127$,
$\varphi_6(q_{78}, a) = q_{F_0}$ $\psi_6(q_{78}, a) = 0$ inače,

$\varphi_6(q_{79}, a) = q_{79}$ $\psi_6(q_{79}, a) = w$ za $a \in \{107, 111\}$,
$\varphi_6(q_{79}, a) = q_{80}$ $\psi_6(q_{79}, a) = e$ za $a \in \{11, 15, 43, 47\}$,
$\varphi_6(q_{79}, a) = q_{F_0}$ $\psi_6(q_{79}, a) = 0$ inače,

$\varphi_6(q_{80}, a) = q_{77}$ $\psi_6(q_{80}, a) = n$ za $a \in \{248, 249, 251\}$,
$\varphi_6(q_{80}, a) = q_{80}$ $\psi_6(q_{80}, a) = e$ za $a \in \{ b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 1\}$,
$\varphi_6(q_{80}, a) = q_{F_0}$ $\psi_6(q_{80}, a) = 0$ inače,

$\varphi_6(q_{81}, a) = q_{81}$ $\psi_6(q_{81}, a) = w$ za $a \in \{82, 83, 91, 114, 115, 122, 123, 70, 71, 79, 102, 103, 110, 111, 66, 67, 75, 98, 99, 106, 107\}$,
$\varphi_6(q_{81}, a) = q_{F_1}$ $\psi_6(q_{81}, a) = 0$ za $a \in \{10, 11, 14, 15, 42, 43, 46, 47\}$,
$\varphi_6(q_{81}, a) = q_{F_0}$ $\psi_6(q_{81}, a) = 0$ inače,

Neka je M = {194, 195, 198, 199, 202, 203, 206, 207, 226, 230, 234, 235, 238, 239} ⊆ A. Tada,

$\psi_{k6}(q_{k6}, (\{q_i\}, a)) = \psi_6(q_i, (\{q_{k6}\}, a))$ za $i \in \{1, 2, 3, 4, 5, 6, 7\}$, $a \in A$,

$\psi_{k6}(q_{k6}, (\{q_8\}, a)) = 0$ $a \in M_1 = \{202, 206, 234, 238, 194, 198, 226, 230\} \subset M$,
$\psi_{k6}(q_{k6}, (\{q_8\}, a)) = \psi_6(q_8, (\{q_{k6}\}, a))$ za $a \notin M_1$,

$\psi_{k6}(q_{k6}, (\{q_9\}, a)) = 0$ $a \in M_1 = \{195, 194, 203, 239, 207, 235\} \subset M$,
$\psi_{k6}(q_{k6}, (\{q_9\}, a)) = \psi_6(q_9, (\{q_{k6}\}, a))$ za $a \notin M_1$,

$\psi_{k6}(q_{k6}, (\{q_{10}\}, a)) = 0$ $a \in M_1 = \{195, 194, 203, 239, 207, 235, 198, 199\} \subset M$,
$\psi_{k6}(q_{k6}, (\{q_{10}\}, a)) = \psi_6(q_{10}, (\{q_{k5}\}, a))$ za $a \notin M_1$,

$\psi_{k6}(q_{k6}, (\{q_{29}\}, a)) = 0$, $a \in A$,
$\varphi_6(q_{29}, (\{q_{k6}\}, a)) = q_{31}$ $\psi_6(q_{29}, (\{q_{k6}\}, a)) = e$ za $a \in M$
$\varphi_6(q_{29}, (\{\lambda\}, a)) = q_{F_0}$ $\psi_6(q_{29}, (\{\lambda\}, a)) = 0$ za $a \in M$, tj. ako se automati A_6, K_6 ne susretnu,

$\psi_{k6}(q_{k6}, (\{q_{30}\}, a)) = 0$, $a \in A$,
$\varphi_6(q_{30}, (\{q_{k6}\}, a)) = q_{31}$ $\psi_6(q_{30}, (\{q_{k6}\}, a)) = e$ za $a \in \{194, 195, 198, 199\} \subset M$,
$\varphi_6(q_{30}, (\{\lambda\}, a)) = q_{F_0}$ $\psi_6(q_{30}, (\{\lambda\}, a)) = 0$ za $a \in \{194, 195, 198, 199\}$, tj. ako se automati A_6, K_6 ne susretnu.

Kolektiv $S_8 = (A_8, K_8)$ je definisan na sljedeći način:
$Q_8 = \{q_i \mid i \in \{1, \ldots, 89\}\} \cup Q_F$,

$\varphi_8(q_1, a) = q_4$ $\psi_8(q_1, a) = n$ za $a = 148$,
$\varphi_8(q_1, a) = q_2$ $\psi_8(q_1, a) = w$ za $a \in \{208, 212\}$,
$\varphi_8(q_1, a) = q_9$ $\psi_8(q_1, a) = w$ za $a \in \{80, 84\}$,
$\varphi_8(q_1, a) = q_{F_0}$ $\psi_8(q_1, a) = 0$ inače,

$\varphi_8(q_2, a) = q_2$ $\psi_8(q_2, a) = w$ za $a \in \{255, 223, 214, 215, \}$,
$\varphi_8(q_2, a) = q_3$ $\psi_8(q_2, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,
$\varphi_8(q_2, a) = q_9$ $\psi_8(q_2, a) = w$ za $a \in \{127, 95, 86, 87\}$,
$\varphi_8(q_2, a) = q_{F_0}$ $\psi_8(q_2, a) = 0$ inače,

$\varphi_8(q_3, a) = q_4$ $\psi_8(q_3, a) = n$ za $a \in \{208, 212, 240, 244, 248, 252\}$,
$\varphi_8(q_3, a) = q_3$ $\psi_8(q_3, a) = e$ za $a \in \{ b \in A \mid b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7$, $a_1 = 1\}$,
$\varphi_8(q_3, a) = q_{F_0}$ $\psi_8(q_3, a) = 0$ inače,

$\varphi_8(q_4, a) = q_5$ $\psi_8(q_4, a) = w$ za $a \in \{208, 212, 240, 244\}$,
$\varphi_8(q_4, a) = q_2$ $\psi_8(q_4, a) = w$ za $a \in \{248, 252\}$,
$\varphi_8(q_4, a) = q_6$ $\psi_8(q_4, a) = e$ za $a \in \{74, 78, 202, 94, 206, 218, 106, 110, 234, 126, 238, 250, 210, 242\}$,
$\varphi_8(q_4, a) = q_4$ $\psi_8(q_4, a) = e$ za $a \in \{214, 246, 222, 254\}$,
$\varphi_8(q_4, a) = q_9$ $\psi_8(q_4, a) = w$ za $a \in \{120, 124\}$,
$\varphi_8(q_4, a) = q_{F_0}$ $\psi_8(q_4, a) = 0$ inače,

$\varphi_8(q_5, a) = q_5$ $\psi_8(q_5, a) = w$ za $a \in \{214, 246\}$,
$\varphi_8(q_5, a) = q_2$ $\psi_8(q_5, a) = w$ za $a \in \{222, 254\}$,
$\varphi_8(q_5, a) = q_{F_0}$ $\psi_8(q_5, a) = 0$ inače,

$\varphi_8(q_6, a) = q_6$ $\psi_8(q_6, a) = e$ za $a \in \{98, 102, 118, 246, 226, 230, 66, 70, 86, 214, 194, 198\}$,
$\varphi_8(q_6, a) = q_7$ $\psi_8(q_6, a) = w$ za $a \in \{112, 116, 244, 240, 80, 84, 208, 212\}$,
$\varphi_8(q_6, a) = q_{F_0}$ $\psi_8(q_6, a) = 0$ inače,

$\varphi_8(q_7, a) = q_7$ $\psi_8(q_7, a) = w$ za $a \in \{98, 102, 118, 246, 66, 70, 86, 214, 242, 210\}$,

$\varphi_8(q_7, a) = q_8$ $\psi_8(q_7, a) = w$ za $a \in \{74, 78, 94, 218, 106, 110, 126, 250, 254, 222\}$,

$\varphi_8(q_7, a) = q_7$ $\psi_8(q_7, a) = w$ za $a \in \{226, 230, 194, 198\}$,

$\varphi_8(q_7, a) = q_8$ $\psi_8(q_7, a) = w$ za $a \in \{202, 206, 234, 238\}$,

$\varphi_8(q_7, a) = q_{F_0}$ $\psi_8(q_7, a) = 0$ inače,

$\varphi_8(q_8, a) = q_8$ $\psi_8(q_8, a) = w$ za $a \in \{255, 223, 215, 251, 219, 211, 71, 79, 111, 107, 75, 67, 214, 66, 210\}$,

$\varphi_8(q_8, a) = q_{10}$ $\psi_8(q_8, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_8(q_8, a) = q_{11}$ $\psi_8(q_8, a) = n$ za $a \in \{18, 19, 27, 146, 147, 155\}$,

$\varphi_8(q_8, a) = q_8$ $\psi_8(q_8, a) = w$ za $a \in \{203, 207, 194, 195, 198, 199, 235, 239\}$,

$\varphi_8(q_8, a) = q_{F_0}$ $\psi_8(q_8, a) = 0$ inače,

$\varphi_8(q_9, a) = q_9$ $\psi_8(q_9, a) = w$ za $a \in \{211, 67, 210, 66, 255, 223, 70, 71, 107, 75, 215, 111, 79, 219, 251, 214\}$,

$\varphi_8(q_9, a) = q_{10}$ $\psi_8(q_9, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_8(q_9, a) = q_{11}$ $\psi_8(q_9, a) = n$ za $a \in \{18, 19, 27, 146, 147, 155\}$,

$\varphi_8(q_9, a) = q_{10}$ $\psi_8(q_9, a) = e$ za $a \in \{203, 207, 194, 195, 198, 199, 235, 239\}$,

$\varphi_8(q_9, a) = q_{F_0}$ $\psi_8(q_9, a) = 0$ inače,

$\varphi_8(q_{10}, a) = q_{11}$ $\psi_8(q_{10}, a) = n$ za $a \in \{210, 211, 219, 218, 250, 251, 242\}$,

$\varphi_8(q_{10}, a) = q_{10}$ $\psi_8(q_{10}, a) = e$ za $a \in \{$ $b \in A|$ $b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,$ $a_1 = 1\}$,

$\varphi_8(q_{10}, a) = q_{F_0}$ $\psi_8(q_{10}, a) = 0$ inače,

$\varphi_8(q_{11}, a) = q_{11}$ $\psi_8(q_{11}, a) = w$ za $a \in \{214, 66, 194, 210, 248, 104, 232, 203, 215, 211, 67, 195, 216, 200, 72, 255, 223, 251, 219, 107, 75, 235, 249, 233, 105, 217, 201, 73\}$,

$\varphi_8(q_{11}, a) = q_{11}$ $\psi_8(q_{11}, a) = n$ za $a \in \{18, 19, 24, 25, 28, 29, 27, 146, 147, 152, 153, 155\}$,

$\varphi_8(q_{11}, a) = q_{12}$ $\psi_8(q_{11}, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_8(q_{11}, a) = q_{13}$ $\psi_8(q_{11}, a) = w$ za $a \in \{253, 125, 221, 93, 95, 127, 88, 92, 220, 252, 124, 120, 121, 89\}$,

$\varphi_8(q_{11}, a) = q_{15}$ $\psi_8(q_{11}, a) = e$ za $a \in \{10, 14, 30\}$,

$\varphi_8(q_{11}, a) = q_{17}$ $\psi_8(q_{11}, a) = e$ za $a \in \{26, 154, 158\}$,

$\varphi_8(q_{11}, a) = q_{F_0}$ $\psi_8(q_{11}, a) = 0$ inače,

$\varphi_8(q_{12}, a) = q_{11}$ $\psi_8(q_{12}, a) = n$ za $a \in \{210, 211, 216, 217, 219, 248, 249, 251\}$,

$\varphi_8(q_{12}, a) = q_{12}$ $\psi_8(q_{12}, a) = e$ za $a \in \{$ $b \in A|$ $b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,$ $a_1 = 1\}$,

$\varphi_8(q_{12}, a) = q_{F_0}$ $\psi_8(q_{12}, a) = 0$ inače,

$\varphi_8(q_{13}, a) = q_{13}$ $\psi_8(q_{13}, a) = w$ za $a \in \{107, 111, 214, 223, 255, 127, 215, 95\}$,

$\varphi_8(q_{13}, a) = q_{14}$ $\psi_8(q_{13}, a) = e$ za $a \in \{11, 15, 7, 43, 47\}$,

$\varphi_8(q_{13}, a) = q_{15}$ $\psi_8(q_{13}, a) = n$ za $a \in \{22, 23, 31, 63\}$,

$\varphi_8(q_{13}, a) = q_{F_0}$ $\psi_8(q_{13}, a) = 0$ inače,

$\varphi_8(q_{14}, a) = q_{14}$ $\psi_8(q_{14}, a) = e$ za $a \in \{107, 111, 79\}$,

$\varphi_8(q_{14}, a) = q_{15}$ $\psi_8(q_{14}, a) = n$ za $a \in \{88, 89, 92, 93, 95, 125, 127, 120, 121, 124\}$,

$\varphi_8(q_{14}, a) = q_{F_0}$ $\psi_8(q_{14}, a) = 0$ inače,

$\varphi_8(q_{15}, a) = q_{15}$ $\psi_8(q_{15}, a) = e$ za $a \in \{246, 63, 30, 10, 14, 110, 111, 214, 66, 70, 86, 254, 126, 127, 106, 107, 43, 47, 62, 46, 42, 255, 31, 15, 11, 118, 98, 102\}$,

$\varphi_8(q_{15}, a) = q_{15}$ $\psi_8(q_{15}, a) = n$ za $a \in \{56, 60, 124, 120, 24, 28, 112, 116, 80, 84\}$,

$\varphi_8(q_{15}, a) = q_{16}$ $\psi_8(q_{15}, a) = w$ za $a \in \{208, 212, 240, 244, 248, 252\}$,

$\varphi_8(q_{15}, a) = q_{17}$ $\psi_8(q_{15}, a) = e$ za $a \in \{154, 158, 26, 186, 190, 58, 59, 155, 159, 187, 191, 215, 211, 210, 250, 251, 242, 243, 247, 99, 103, 114, 115, 119, 122, 123, 67, 71, 82, 83, 87, 250\}$,

$\varphi_8(q_{15}, a) = q_{F_0}$ $\psi_8(q_{15}, a) = 0$ inače,

$\varphi_8(q_{16}, a) = q_{15}$ $\psi_8(q_{16}, a) = n$ za $a \in \{30, 31, 62, 63, 86, 118, 126, 127\}$,

$\varphi_8(q_{16}, a) = q_{16}$ $\psi_8(q_{16}, a) = w$ za $a \in \{$ $b \in A|$ $b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,$ $a_6 = 1\}$,

$\varphi_8(q_{16}, a) = q_{F_0}$ $\psi_8(q_{16}, a) = 0$ inače,

$\varphi_8(q_{17}, a) = q_{17}$ $\psi_8(q_{17}, a) = e$ za $a \in \{66, 67, 70, 71, 86, 87, 98, 99, 102, 103, 106, 107, 110, 111, 118, 119, 126, 127, 214, 215, 246, 247, 254, 255, 234, 235, 238, 239, 194, 195, 198, 199, 226, 227, 230, 231, 242, 243, 251\}$,

$\varphi_8(q_{17}, a) = q_{18}$ $\psi_8(q_{17}, a) = s$ za $a \in \{93, 95, 75, 79, 203, 207, 220, 216, 88, 89, 92, 219, 223, 221, 217, 72, 73, 91, 200, 201\}$,

$\varphi_8(q_{17}, a) = q_{F_0}$ $\psi_8(q_{17}, a) = 0$ inače,

$\varphi_8(q_{18}, a) = q_{18}$ $\psi_8(q_{18}, a) = e$ za $a \in \{107, 66, 67, 75, 31, 22, 23, 235, 203, 194, 195, 27, 18, 19, 255, 251, 223, 219, 214, 210, 215, 211, 159, 151, 150, 155, 146, 147\}$,

$\varphi_8(q_{18}, a) = q_{18}$ $\psi_8(q_{18}, a) = s$ za $a \in \{24, 25, 72, 73, 152, 153, 216, 217, 200, 201, 184, 56\}$,

$\varphi_8(q_{18}, a) = q_{19}$ $\psi_8(q_{18}, a) = w$ za $a \in \{104, 105, 232, 233, 248, 249\}$,

$\varphi_8(q_{18}, a) = q_{20}$ $\psi_8(q_{18}, a) = e$ za $a \in \{154, 158, 30, 62, 63, 59, 58, 26, 254, 250, 186, 187, 190, 191\}$,

$\varphi_8(q_{18}, a) = q_{22}$ $\psi_8(q_{18}, a) = w$ za $a \in \{80, 112, 120\}$,

$\varphi_8(q_{18}, a) = q_{F_0}$ $\psi_8(q_{18}, a) = 0$ inače,

$\varphi_8(q_{19}, a) = q_{18}$ $\psi_8(q_{19}, a) = s$ za $a \in \{223, 219, 203, 75, 31, 159, 27, 155\}$,

$\varphi_8(q_{19}, a) = q_{19}$ $\psi_8(q_{19}, a) = w$ za $a \in \{\ b \in A|\ b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_6 = 1\}$,

$\varphi_8(q_{19}, a) = q_{F_0}$ $\psi_8(q_{19}, a) = 0$ inače,

$\varphi_8(q_{20}, a) = q_{20}$ $\psi_8(q_{20}, a) = e$ za $a \in \{235, 246, 214, 251, 254, 255, 250, 107\}$,

$\varphi_8(q_{20}, a) = q_{21}$ $\psi_8(q_{20}, a) = w$ za $a \in \{208, 212, 224, 240, 244\}$,

$\varphi_8(q_{20}, a) = q_{22}$ $\psi_8(q_{20}, a) = s$ za $a \in \{104, 232, 248, 252\}$,

$\varphi_8(q_{20}, a) = q_{F_0}$ $\psi_8(q_{20}, a) = 0$ inače,

$\varphi_8(q_{21}, a) = q_{22}$ $\psi_8(q_{21}, a) = s$ za $a \in \{154, 158, 30, 62, 58, 26, 254, 250, 186, 190\}$,

$\varphi_8(q_{21}, a) = q_{21}$ $\psi_8(q_{21}, a) = w$ za $a \in \{\ b \in A|\ b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_6 = 1\}$,

$\varphi_8(q_{21}, a) = q_{F_0}$ $\psi_8(q_{21}, a) = 0$ inače,

$\varphi_8(q_{22}, a) = q_{22}$ $\psi_8(q_{22}, a) = w$ za $a \in \{246, 66, 98, 120, 80, 112, 106, 107, 255, 127, 254, 126, 214, 86, 118, 248, 240, 208, 70, 102, 110, 124, 116, 84, 252, 244, 212, 111\}$,

$\varphi_8(q_{22}, a) = q_{22}$ $\psi_8(q_{22}, a) = s$ za $a \in \{14, 46, 28, 60, 62, 30, 24, 56, 10, 42\}$,

$\varphi_8(q_{22}, a) = q_{23}$ $\psi_8(q_{22}, a) = e$ za $a \in \{11, 15, 31, 43, 47, 63\}$,

$\varphi_8(q_{22}, a) = q_{24}$ $\psi_8(q_{22}, a) = w$ za $a \in \{222, 78, 95, 223, 94, 74, 79, 75\}$,

$\varphi_8(q_{22}, a) = q_{25}$ $\psi_8(q_{22}, a) = e$ za $a \in \{235, 203, 226, 194, 202, 234, 198, 230, 206, 238, 207, 239\}$,

$\varphi_8(q_{22}, a) = q_{F_0}$ $\psi_8(q_{22}, a) = 0$ inače,

$\varphi_8(q_{23}, a) = q_{22}$ $\psi_8(q_{23}, a) = s$ za $a \in \{126, 120, 106, 124, 252, 248, 110, 254\}$,

$\varphi_8(q_{23}, a) = q_{23}$ $\psi_8(q_{23}, a) = e$ za $a \in \{\ b \in A|\ b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_1 = 1\}$,

$\varphi_8(q_{23}, a) = q_{F_0}$ $\psi_8(q_{23}, a) = 0$ inače,

$\varphi_8(q_{24}, a) = q_{24}$ $\psi_8(q_{24}, a) = w$ za $a \in \{215, 87, 67, 71, 214, 86, 70, 66\}$,

$\varphi_8(q_{24}, a) = q_{25}$ $\psi_8(q_{24}, a) = e$ za $a \in \{194, 195, 198, 199\}$,

$\varphi_8(q_{24}, a) = q_{F_0}$ $\psi_8(q_{24}, a) = 0$ inače,

$\varphi_8(q_{25}, a) = q_{25}$ $\psi_8(q_{25}, a) = e$ za $a \in \{\ b \in A|\ b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_1 = 1,\ a_4 = 0\}$,

$\varphi_8(q_{25}, a) = q_{25}$ $\psi_8(q_{25}, a) = n$ za $a \in \{\ b \in A|\ 24 \le b \le 31$ ili $56 \le b \le 63$ ili $80 \le b \le 95$ ili $112 \le b \le 127\}$,

$\varphi_8(q_{25}, a) = q_{26}$ $\psi_8(q_{25}, a) = n$ za $a \in \{b \in A|\ 144 \le b \le 159$ ili $184 \le b \le 191\}$,

$\varphi_8(q_{25}, a) = q_{F_0}$ $\psi_8(q_{25}, a) = 0$ inače,

$\varphi_8(q_{26}, a) = q_{26}$ $\psi_8(q_{26}, a) = w$ za $a \in \{\ b \in A|\ 64 \le b \le 103$ ili $112 \le b \le 119$ ili $192 \le b \le 231$ ili $240 \le b \le 247\}$,

$\varphi_8(q_{26}, a) = q_{26}$ $\psi_8(q_{26}, a) = n$ za $a \in \{\ b \in A|\ 16 \le b \le 25$ ili $b = 27$ ili $b = 28$ ili $b = 29$ ili $b = 31$ ili $144 \le b \le 159\}$,

$\varphi_8(q_{26}, a) = q_{46}$ $\psi_8(q_{26}, a) = e$ za $a \in \{26, 58, 186, 190, 154, 158\}$,

$\varphi_8(q_{26}, a) = q_{27}$ $\psi_8(q_{26}, a) = w$ za $a \in \{106, 110, 122, 126, 234, 250, 254, 238\}$,

$\varphi_8(q_{26}, a) = q_{30}$ $\psi_8(q_{26}, a) = e$ za $a \in \{10, 42\}$,

$\varphi_8(q_{26}, a) = q_{28}$ $\psi_8(q_{26}, a) = e$ za $a \in \{14, 30, 46, 62\}$,

$\varphi_8(q_{26}, a) = q_{F_0}$ $\psi_8(q_{26}, a) = 0$ inače,

$\varphi_8(q_{27}, a) = q_{27}$ $\psi_8(q_{27}, a) = w$ za $a \in \{107, 111, 127, 123, 235, 239, 251, 255\}$,

$\varphi_8(q_{27}, a) = q_{28}$ $\psi_8(q_{27}, a) = e$ za $a \in \{15, 31, 63, 47\}$,

$\varphi_8(q_{27}, a) = q_{46}$ $\psi_8(q_{27}, a) = e$ za $a \in \{27, 187, 59, 155, 159, 191\}$,

$\varphi_8(q_{27}, a) = q_{30}$ $\psi_8(q_{27}, a) = e$ za $a \in \{11, 43\}$,

$\varphi_8(q_{27}, a) = q_{F_0}$ $\psi_8(q_{27}, a) = 0$ inače,

$\varphi_8(q_{28}, a) = q_{28}$ $\psi_8(q_{28}, a) = e$ za $a \in \{254, 255, 246, 247, 214, 215, 126, 127, 118, 119, 86, 87\}$,

$\varphi_8(q_{28}, a) = q_{29}$ $\psi_8(q_{28}, a) = e$ za $a \in \{122, 123,$
$114, 115, 82, 83, 250, 251, 242, 243, 210, 211\}$,

$\varphi_8(q_{28}, a) = q_{31}$ $\psi_8(q_{28}, a) = e$ za $a \in \{95, 223\}$,

$\varphi_8(q_{28}, a) = q_{32}$ $\psi_8(q_{28}, a) = e$ za $a \in \{91, 219\}$,

$\varphi_8(q_{28}, a) = q_{36}$ $\psi_8(q_{28}, a) = n$ za $a \in \{216, 217\}$,

$\varphi_8(q_{28}, a) = q_{53}$ $\psi_8(q_{28}, a) = n$ za $a \in \{220, 221\}$,

$\varphi_8(q_{28}, a) = q_{F_0}$ $\psi_8(q_{28}, a) = 0$ inače,

$\varphi_8(q_{29}, a) = q_{29}$ $\psi_8(q_{29}, a) = e$ za $a \in \{234, 235,$
$226, 227, 194, 195, 106, 107, 98, 99, 66, 67\}$,

$\varphi_8(q_{29}, a) = q_{32}$ $\psi_8(q_{29}, a) = e$ za $a \in \{203, 75\}$,

$\varphi_8(q_{29}, a) = q_{46}$ $\psi_8(q_{29}, a) = e$ za $a \in \{239, 207,$
$231, 238, 199, 230, 198, 111, 110, 102, 70, 71,$
$103, 79\}$,

$\varphi_8(q_{29}, a) = q_{35}$ $\psi_8(q_{29}, a) = w$ za $a \in \{200, 201,$
$72, 73\}$,

$\varphi_8(q_{29}, a) = q_{F_0}$ $\psi_8(q_{29}, a) = 0$ inače,

$\varphi_8(q_{30}, a) = q_{30}$ $\psi_8(q_{30}, a) = e$ za $a \in \{66, 67, 98,$
$99, 106, 107\}$,

$\varphi_8(q_{30}, a) = q_{28}$ $\psi_8(q_{30}, a) = e$ za $a \in \{110, 111,$
$102, 103, 70, 71\}$,

$\varphi_8(q_{30}, a) = q_{31}$ $\psi_8(q_{30}, a) = e$ za $a = 79$,

$\varphi_8(q_{30}, a) = q_{33}$ $\psi_8(q_{30}, a) = e$ za $a = 75$,

$\varphi_8(q_{30}, a) = q_{F_0}$ $\psi_8(q_{30}, a) = 0$ inače,

$\varphi_8(q_{31}, a) = q_{36}$ $\psi_8(q_{31}, a) = n$ za $a \in \{248, 249\}$,

$\varphi_8(q_{31}, a) = q_{53}$ $\psi_8(q_{31}, a) = n$ za $a \in \{252, 253\}$,

$\varphi_8(q_{31}, a) = q_{31}$ $\psi_8(q_{31}, a) = e$ za $a \in \{127, 255\}$,

$\varphi_8(q_{31}, a) = q_{32}$ $\psi_8(q_{31}, a) = e$ za $a \in \{123, 251\}$,

$\varphi_8(q_{31}, a) = q_{F_0}$ $\psi_8(q_{31}, a) = 0$ inače,

$\varphi_8(q_{32}, a) = q_{35}$ $\psi_8(q_{32}, a) = w$ za $a \in \{72, 73,$
$104, 105, 232, 233\}$,

$\varphi_8(q_{32}, a) = q_{32}$ $\psi_8(q_{32}, a) = e$ za $a \in \{107, 235\}$,

$\varphi_8(q_{32}, a) = q_{47}$ $\psi_8(q_{32}, a) = e$ za $a = 111$,

$\varphi_8(q_{32}, a) = q_{F_0}$ $\psi_8(q_{32}, a) = 0$ inače,

$\varphi_8(q_{33}, a) = q_{33}$ $\psi_8(q_{33}, a) = e$ za $a = 107$,

$\varphi_8(q_{33}, a) = q_{34}$ $\psi_8(q_{33}, a) = e$ za $a = 111$,

$\varphi_8(q_{33}, a) = q_{F_0}$ $\psi_8(q_{33}, a) = 0$ inače,

$\varphi_8(q_{34}, a) = q_{34}$ $\psi_8(q_{34}, a) = e$ za $a \in \{127, 255\}$,

$\varphi_8(q_{34}, a) = q_{36}$ $\psi_8(q_{34}, a) = n$ za $a \in \{248, 249\}$,

$\varphi_8(q_{34}, a) = q_{32}$ $\psi_8(q_{34}, a) = e$ za $a \in \{123, 251\}$,

$\varphi_8(q_{34}, a) = q_{F_0}$ $\psi_8(q_{34}, a) = 0$ inače.

$\varphi_8(q_{35}, a) = q_{36}$ $\psi_8(q_{35}, a) = n$ za $a \in \{210, 114,$
$115, 122, 123, 82, 242, 243, 250, 251, 219, 83,$
$211, 91\}$, ·

$\varphi_8(q_{35}, a) = q_{35}$ $\psi_8(q_{35}, a) = w$ za $a \in \{$ $b \in A|$ $b =$
$a_0+a_12+a_22^2+a_32^3+a_42^4+a_52^5+a_62^6+a_72^7$, $a_6 = 1\}$,

$\varphi_8(q_{35}, a) = q_{F_0}$ $\psi_8(q_{35}, a) = 0$ inače,

$\varphi_8(q_{36}, a) = q_{36}$ $\psi_8(q_{36}, a) = n$ za $a = 123$,

$\varphi_8(q_{36}, a) = q_{36}$ $\psi_8(q_{36}, a) = w$ za $a \in \{104, 105,$
$107, 232, 233, 235\}$,

$\varphi_8(q_{36}, a) = q_{37}$ $\psi_8(q_{36}, a) = w$ za $a \in \{248, 249,$
$251\}$,

$\varphi_8(q_{36}, a) = q_{48}$ $\psi_8(q_{36}, a) = w$ za $a \in \{120, 121,$
$124, 125\}$,

$\varphi_8(q_{36}, a) = q_{42}$ $\psi_8(q_{36}, a) = w$ za $a \in \{252, 253\}$,

$\varphi_8(q_{36}, a) = q_{40}$ $\psi_8(q_{36}, a) = s$ za $a = 189$,

$\varphi_8(q_{36}, a) = q_{F_0}$ $\psi_8(q_{36}, a) = 0$ inače,

$\varphi_8(q_{37}, a) = q_{37}$ $\psi_8(q_{37}, a) = w$ za $a = 255$,

$\varphi_8(q_{37}, a) = q_{39}$ $\psi_8(q_{37}, a) = e$ za $a \in \{31, 63\}$,

$\varphi_8(q_{37}, a) = q_{50}$ $\psi_8(q_{37}, a) = e$ za $a \in \{159, 191\}$,

$\varphi_8(q_{37}, a) = q_{38}$ $\psi_8(q_{37}, a) = w$ za $a = 127$,

$\varphi_8(q_{37}, a) = q_{F_0}$ $\psi_8(q_{37}, a) = 0$ inače,

$\varphi_8(q_{38}, a) = q_{38}$ $\psi_8(q_{38}, a) = w$ za $a \in \{107, 111\}$,

$\varphi_8(q_{38}, a) = q_{39}$ $\psi_8(q_{38}, a) = e$ za $a \in \{11, 15, 43,$
$47\}$,

$\varphi_8(q_{38}, a) = q_{44}$ $\psi_8(q_{38}, a) = w$ za $a \in \{239, 235\}$,

$\varphi_8(q_{38}, a) = q_{F_0}$ $\psi_8(q_{38}, a) = 0$ inače,

$\varphi_8(q_{39}, a) = q_{36}$ $\psi_8(q_{38}, a) = n$ za $a \in \{248, 249,$
$251\}$,

$\varphi_8(q_{39}, a) = q_{39}$ $\psi_8(q_{39}, a) = e$ za $a \in \{$ $b \in A|$ $b =$
$a_0+a_12+a_22^2+a_32^3+a_42^4+a_52^5+a_62^6+a_72^7$, $a_1 = 1\}$,

$\varphi_8(q_{39}, a) = q_{F_0}$ $\psi_8(q_{39}, a) = 0$ inače,

$\varphi_8(q_{40}, a) = q_{40}$ $\psi_8(q_{40}, a) = w$ za $a \in \{82, 83, 91,$
$114, 115, 122, 123, 70, 71, 79, 102, 103, 110,$
$111, 66, 67, 75, 98, 99, 106, 107\}$,

$\varphi_8(q_{40}, a) = q_{41}$ $\psi_8(q_{40}, a) = e$ za $a \in \{10, 11, 14,$
$15, 42, 43, 46, 47\}$,

$\varphi_8(q_{40}, a) = q_{F_0}$ $\psi_8(q_{40}, a) = 0$ inače,

$\varphi_8(q_{41}, a) = q_{53}$ $\psi_8(q_{41}, a) = n$ za $a = 189$,

$\varphi_8(q_{41}, a) = q_{41}$ $\psi_8(q_{41}, a) = n$ za $a \in \{122, 123,$
$114, 115, 82, 83, 91\}$,

$\varphi_8(q_{41}, a) = q_{41}$ $\psi_8(q_{41}, a) = e$ za $a \in \{$ $b \in A|$ $b =$
$a_0+a_12+a_22^2+a_32^3+a_42^4+a_52^5+a_62^6+a_72^7$, $a_1 = 1\}$,

$\varphi_8(q_{41}, a) = q_{F_0}$ $\psi_8(q_{41}, a) = 0$ inače,

$\varphi_8(q_{42}, a) = q_{42}$ $\psi_8(q_{42}, a) = w$ za $a = 255$,

$\varphi_8(q_{42}, a) = q_{43}$ $\psi_8(q_{42}, a) = e$ za $a \in \{31, 191, 63, 159\}$,

$\varphi_8(q_{42}, a) = q_{48}$ $\psi_8(q_{42}, a) = w$ za $a = 127$,

$\varphi_8(q_{42}, a) = q_{F_0}$ $\psi_8(q_{42}, a) = 0$ inače,

$\varphi_8(q_{43}, a) = q_{43}$ $\psi_8(q_{43}, a) = e$ za $a = 255$,

$\varphi_8(q_{43}, a) = q_{53}$ $\psi_8(q_{43}, a) = n$ za $a \in \{252, 253\}$,

$\varphi_8(q_{43}, a) = q_{F_0}$ $\psi_8(q_{43}, a) = 0$ inače,

$\varphi_8(q_{44}, a) = q_{44}$ $\psi_8(q_{44}, a) = w$ za $a \in \{251, 255\}$,

$\varphi_8(q_{44}, a) = q_{45}$ $\psi_8(q_{44}, a) = e$ za $a \in \{31, 191, 27, 63, 159, 187, 59, 155\}$,

$\varphi_8(q_{44}, a) = q_{F_0}$ $\psi_8(q_{44}, a) = 0$ inače,

$\varphi_8(q_{45}, a) = q_{48}$ $\psi_8(q_{45}, a) = w$ za $a \in \{243, 249\}$,

$\varphi_8(q_{45}, a) = q_{45}$ $\psi_8(q_{45}, a) = e$ za $a \in \{ b \in A |\ b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_1 = 1 \}$,

$\varphi_8(q_{45}, a) = q_{F_0}$ $\psi_8(q_{45}, a) = 0$ inače,

$\varphi_8(q_{46}, a) = q_{48}$ $\psi_8(q_{46}, a) = w$ za $a \in \{216, 217, 220, 221, 88, 89, 92, 93\}$,

$\varphi_8(q_{46}, a) = q_{47}$ $\psi_8(q_{46}, a) = e$ za $a \in \{223, 79, 95, 75, 219, 203, 207\}$,

$\varphi_8(q_{46}, a) = q_{46}$ $\psi_8(q_{46}, a) = e$ za $a \in \{ b \in A |\ b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_1 = 1 \}$,

$\varphi_8(q_{46}, a) = q_{F_0}$ $\psi_8(q_{46}, a) = 0$ inače,

$\varphi_8(q_{47}, a) = q_{47}$ $\psi_8(q_{47}, a) = e$ za $a \in \{111, 127, 107, 251, 235, 255, 239\}$,

$\varphi_8(q_{47}, a) = q_{48}$ $\psi_8(q_{47}, a) = w$ za $a \in \{248, 249, 252, 253, 120, 121, 124, 125\}$,

$\varphi_8(q_{47}, a) = q_{F_0}$ $\psi_8(q_{47}, a) = 0$ inače,

$\varphi_8(q_{48}, a) = q_{48}$ $\psi_8(q_{48}, a) = w$ za $a \in \{255, 127, 223, 95, 111, 79, 247, 119, 215, 87, 103, 71, 67, 99, 75, 107, 126, 254, 110, 246, 214, 118, 86, 70, 102, 106, 98, 66\}$,

$\varphi_8(q_{48}, a) = q_{50}$ $\psi_8(q_{48}, a) = e$ za $a \in \{158, 159, 190, 191\}$,

$\varphi_8(q_{48}, a) = q_{F_0}$ $\psi_8(q_{48}, a) = 0$ inače,

$\varphi_8(q_{49}, a) = q_{49}$ $\psi_8(q_{49}, a) = w$ za $a \in \{251, 211, 243, 250, 210, 242, 255, 214, 246, 254, 219, 215, 247, 223\}$,

$\varphi_8(q_{49}, a) = q_{50}$ $\psi_8(q_{49}, a) = e$ za $a \in \{30, 31, 62, 63, 158, 159, 190, 191\}$,

$\varphi_8(q_{49}, a) = q_{60}$ $\psi_8(q_{49}, a) = n$ za $a \in \{187, 155, 59, 27, 186, 154, 58, 26\}$,

$\varphi_8(q_{49}, a) = q_{F_0}$ $\psi_8(q_{49}, a) = 0$ inače,

$\varphi_8(q_{50}, a) = q_{60}$ $\psi_8(q_{50}, a) = n$ za $a \in \{251, 211, 243, 250, 210, 242, 219\}$,

$\varphi_8(q_{50}, a) = q_{53}$ $\psi_8(q_{50}, a) = n$ za $a \in \{216, 217, 220, 221, 248, 249, 252, 253\}$,

$\varphi_8(q_{50}, a) = q_{50}$ $\psi_8(q_{50}, a) = e$ za $a \in \{ b \in A |\ b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_1 = 1 \}$,

$\varphi_8(q_{50}, a) = q_{F_0}$ $\psi_8(q_{50}, a) = 0$ inače,

$\varphi_8(q_{51}, a) = q_{51}$ $\psi_8(q_{51}, a) = w$ za $a \in \{255, 223, 214, 215, \}$,

$\varphi_8(q_{51}, a) = q_{52}$ $\psi_8(q_{51}, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_8(q_{51}, a) = q_{58}$ $\psi_8(q_{51}, a) = w$ za $a \in \{127, 95, 86, 87\}$,

$\varphi_8(q_{51}, a) = q_{F_0}$ $\psi_8(q_{51}, a) = 0$ inače,

$\varphi_8(q_{52}, a) = q_{53}$ $\psi_8(q_{52}, a) = n$ za $a \in \{208, 212, 240, 244, 248, 252\}$,

$\varphi_8(q_{52}, a) = q_{52}$ $\psi_8(q_{52}, a) = e$ za $a \in \{ b \in A |\ b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7,\ a_1 = 1 \}$,

$\varphi_8(q_{52}, a) = q_{F_0}$ $\psi_8(q_{52}, a) = 0$ inače,

$\varphi_8(q_{53}, a) = q_{54}$ $\psi_8(q_{53}, a) = w$ za $a \in \{208, 212, 240, 244\}$,

$\varphi_8(q_{53}, a) = q_{51}$ $\psi_8(q_{53}, a) = w$ za $a \in \{248, 252\}$,

$\varphi_8(q_{53}, a) = q_{55}$ $\psi_8(q_{53}, a) = e$ za $a \in \{74, 78, 202, 94, 206, 218, 106, 110, 234, 126, 238, 250, 210, 242\}$,

$\varphi_8(q_{53}, a) = q_{53}$ $\psi_8(q_{53}, a) = e$ za $a \in \{214, 246, 222, 254\}$,

$\varphi_8(q_{53}, a) = q_{F_0}$ $\psi_8(q_{53}, a) = 0$ inače,

$\varphi_8(q_{54}, a) = q_{54}$ $\psi_8(q_{54}, a) = w$ za $a \in \{214, 246\}$,

$\varphi_8(q_{54}, a) = q_{51}$ $\psi_8(q_{54}, a) = w$ za $a \in \{222, 254\}$,

$\varphi_8(q_{54}, a) = q_{F_0}$ $\psi_8(q_{54}, a) = 0$ inače,

$\varphi_8(q_{55}, a) = q_{55}$ $\psi_8(q_{55}, a) = e$ za $a \in \{98, 102, 118, 246, 226, 230, 66, 70, 86, 214, 194, 198\}$,

$\varphi_8(q_{55}, a) = q_{56}$ $\psi_8(q_{55}, a) = w$ za $a \in \{112, 116, 244, 240, 80, 84, 208, 212\}$,

$\varphi_8(q_{55}, a) = q_{F_0}$ $\psi_8(q_{55}, a) = 0$ inače,

$\varphi_8(q_{56}, a) = q_{56}$ $\psi_8(q_{56}, a) = w$ za $a \in \{98, 102, 118, 246, 66, 70, 86, 214, 242, 210\}$,

$\varphi_8(q_{56}, a) = q_{57}$ $\psi_8(q_{56}, a) = w$ za $a \in \{74, 78, 94, 218, 106, 110, 126, 250, 254, 222\}$,

$\varphi_8(q_{56}, a) = q_{56}$ $\psi_8(q_{56}, a) = w$ za $a \in \{226, 230, 194, 198\}$,

$\varphi_8(q_{56}, a) = q_{57}$ $\psi_8(q_{56}, a) = w$ za $a \in \{202, 206, 234, 238\}$,

$\varphi_8(q_{56}, a) = q_{F_0}$ $\psi_8(q_{56}, a) = 0$ inače,

$\varphi_8(q_{57}, a) = q_{57}$ $\psi_8(q_8, a) = w$ za $a \in \{255, 223, 215, 251, 219, 211, 71, 79, 111, 107, 75, 67, 214, 66, 210\}$,

$\varphi_8(q_{57}, a) = q_{59}$ $\psi_8(q_{57}, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_8(q_{57}, a) = q_{60}$ $\psi_8(q_{57}, a) = n$ za $a \in \{18, 19, 27, 146, 147, 155\}$,

$\varphi_8(q_{57}, a) = q_{57}$ $\psi_8(q_{57}, a) = w$ za $a \in \{203, 207, 194, 195, 235, 239, 198, 199\}$,

$\varphi_8(q_{57}, a) = q_{F_0}$ $\psi_8(q_{57}, a) = 0$ inače,

$\varphi_8(q_{58}, a) = q_{58}$ $\psi_8(q_9, a) = w$ za $a \in \{211, 67, 210, 66, 255, 223, 70, 71, 107, 75, 215, 111, 79, 219, 251, 214\}$,

$\varphi_8(q_{58}, a) = q_{59}$ $\psi_8(q_{58}, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_8(q_{58}, a) = q_{60}$ $\psi_8(q_{58}, a) = n$ za $a \in \{18, 19, 27, 146, 147, 155\}$,

$\varphi_8(q_{58}, a) = q_{58}$ $\psi_8(q_{58}, a) = w$ za $a \in \{203, 207, 194, 195, 235, 239, 198, 199\}$,

$\varphi_8(q_{58}, a) = q_{F_0}$ $\psi_8(q_{58}, a) = 0$ inače,

$\varphi_8(q_{59}, a) = q_{60}$ $\psi_8(q_{59}, a) = n$ za $a \in \{210, 211, 219, 218, 250, 251, 242\}$,

$\varphi_8(q_{59}, a) = q_{59}$ $\psi_8(q_{59}, a) = e$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 1\}$,

$\varphi_8(q_{59}, a) = q_{F_0}$ $\psi_8(q_{59}, a) = 0$ inače,

$\varphi_8(q_{60}, a) = q_{60}$ $\psi_8(q_{60}, a) = w$ za $a \in \{214, 66, 194, 210, 248, 104, 232, 203, 215, 211, 67, 195, 216, 200, 72, 255, 223, 251, 219, 107, 75, 235, 249, 233, 105, 217, 201, 73\}$,

$\varphi_8(q_{60}, a) = q_{60}$ $\psi_8(q_{60}, a) = n$ za $a \in \{18, 19, 24, 25, 28, 29, 27, 146, 147, 152, 153, 155\}$,

$\varphi_8(q_{60}, a) = q_{61}$ $\psi_8(q_{60}, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_8(q_{60}, a) = q_{62}$ $\psi_8(q_{60}, a) = w$ za $a \in \{253, 125, 221, 93, 95, 127, 88, 92, 220, 252, 124, 120, 121, 89\}$,

$\varphi_8(q_{60}, a) = q_{64}$ $\psi_8(q_{60}, a) = e$ za $a \in \{10, 14, 30\}$,

$\varphi_8(q_{60}, a) = q_{F_0}$ $\psi_8(q_{60}, a) = 0$ inače,

$\varphi_8(q_{61}, a) = q_{60}$ $\psi_8(q_{61}, a) = n$ za $a \in \{210, 211, 216, 217, 219, 248, 249, 251\}$,

$\varphi_8(q_{61}, a) = q_{61}$ $\psi_8(q_{61}, a) = e$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 1\}$,

$\varphi_8(q_{61}, a) = q_{F_0}$ $\psi_8(q_{61}, a) = 0$ inače,

$\varphi_8(q_{62}, a) = q_{62}$ $\psi_8(q_{62}, a) = w$ za $a \in \{107, 111, 214, 223, 255, 127, 215, 95\}$,

$\varphi_8(q_{62}, a) = q_{63}$ $\psi_8(q_{62}, a) = e$ za $a \in \{11, 15, 7, 43, 47\}$,

$\varphi_8(q_{62}, a) = q_{64}$ $\psi_8(q_{62}, a) = n$ za $a \in \{22, 23, 31, 63\}$,

$\varphi_8(q_{62}, a) = q_{F_0}$ $\psi_8(q_{62}, a) = 0$ inače,

$\varphi_8(q_{63}, a) = q_{63}$ $\psi_8(q_{63}, a) = e$ za $a \in \{107, 111, 79\}$,

$\varphi_8(q_{63}, a) = q_{64}$ $\psi_8(q_{63}, a) = n$ za $a \in \{88, 89, 92, 93, 95, 125, 127, 120, 121, 124\}$,

$\varphi_8(q_{63}, a) = q_{F_0}$ $\psi_8(q_{63}, a) = 0$ inače,

$\varphi_8(q_{64}, a) = q_{64}$ $\psi_8(q_{64}, a) = e$ za $a \in \{246, 63, 30, 10, 14, 110, 111, 214, 66, 70, 86, 254, 126, 127, 106, 107, 43, 47, 62, 46, 42, 255, 31, 15, 11, 118, 98, 102\}$,

$\varphi_8(q_{64}, a) = q_{64}$ $\psi_8(q_{64}, a) = n$ za $a \in \{56, 60, 124, 120, 24, 28, 112, 116, 80, 84\}$,

$\varphi_8(q_{64}, a) = q_{65}$ $\psi_8(q_{64}, a) = w$ za $a \in \{208, 212, 240, 244, 248, 252\}$,

$\varphi_8(q_{64}, a) = q_{66}$ $\psi_8(q_{64}, a) = e$ za $a \in \{242, 247, 243, 119, 114, 115, 103, 99, 250, 251, 122, 123, 215, 210, 211, 67, 71, 87, 82, 83\}$,

$\varphi_8(q_{64}, a) = q_{F_0}$ $\psi_8(q_{64}, a) = 0$ inače,

$\varphi_8(q_{65}, a) = q_{64}$ $\psi_8(q_{65}, a) = n$ za $a \in \{30, 31, 62, 63, 86, 118, 126, 127\}$,

$\varphi_8(q_{65}, a) = q_{65}$ $\psi_8(q_{65}, a) = w$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_6 = 1\}$,

$\varphi_8(q_{65}, a) = q_{F_0}$ $\psi_8(q_{65}, a) = 0$ inače,

$\varphi_8(q_{66}, a) = q_{66}$ $\psi_8(q_{66}, a) = e$ za $a \in \{66, 67, 106, 107, 98, 99, 194, 195, 226, 227, 234, 235\}$,

$\varphi_8(q_{66}, a) = q_{67}$ $\psi_8(q_{66}, a) = s$ za $a \in \{223, 219, 216, 217, 200, 201, 203, 91, 95, 75, 79, 72, 73\}$,

$\varphi_8(q_{66}, a) = q_{F_0}$ $\psi_8(q_{66}, a) = 0$ inače,

$\varphi_8(q_{67}, a) = q_{67}$ $\psi_8(q_{67}, a) = e$ za $a \in \{107, 66, 67, 75, 31, 22, 23, 235, 203, 194, 195, 27, 18, 19, 255, 251, 223, 219, 214, 210, 215, 211, 159, 151, 150, 155, 146, 147\}$,

$\varphi_8(q_{67}, a) = q_{67}$ $\psi_8(q_{67}, a) = s$ za $a \in \{24, 25, 72, 73, 152, 153, 216, 217, 200, 201, 184, 56\}$,

$\varphi_8(q_{67}, a) = q_{68}$ $\psi_8(q_{67}, a) = w$ za $a \in \{104, 105, 232, 233, 248, 249\}$,

$\varphi_8(q_{67}, a) = q_{69}$ $\psi_8(q_{67}, a) = e$ za $a\in\{154, 158, 30, 62, 63, 59, 58, 26, 254, 250, 186, 187, 190, 191\}$,

$\varphi_8(q_{67}, a) = q_{71}$ $\psi_8(q_{67}, a) = w$ za $a\in\{80, 112, 120\}$,

$\varphi_8(q_{67}, a) = q_{73}$ $\psi_8(q_{67}, a) = w$ za $a\in\{88, 89, 121\}$,

$\varphi_8(q_{67}, a) = q_{F_0}$ $\psi_8(q_{67}, a) = 0$ inače,

$\varphi_8(q_{68}, a) = q_{67}$ $\psi_8(q_{68}, a) = s$ za $a\in\{223, 219, 203, 75, 31, 159, 27, 155\}$,

$\varphi_8(q_{68}, a) = q_{68}$ $\psi_8(q_{68}, a) = w$ za $a\in\{$ $b\in A|$ $b = a_0+a_1 2+a_2 2^2+a_3 2^3+a_4 2^4+a_5 2^5+a_6 2^6+a_7 2^7$, $a_6 = 1\}$,

$\varphi_8(q_{68}, a) = q_{F_0}$ $\psi_8(q_{68}, a) = 0$ inače,

$\varphi_8(q_{69}, a) = q_{69}$ $\psi_8(q_{69}, a) = e$ za $a\in\{235, 246, 214, 251, 254, 255, 250, 107\}$,

$\varphi_8(q_{69}, a) = q_{70}$ $\psi_8(q_{69}, a) = w$ za $a\in\{208, 212, 224, 240, 244\}$,

$\varphi_8(q_{69}, a) = q_{71}$ $\psi_8(q_{69}, a) = s$ za $a\in\{104, 232, 248, 252\}$,

$\varphi_8(q_{69}, a) = q_{F_0}$ $\psi_8(q_{69}, a) = 0$ inače,

$\varphi_8(q_{70}, a) = q_{71}$ $\psi_8(q_{70}, a) = s$ za $a\in\{154, 158, 30, 62, 58, 26, 254, 250, 186, 190\}$,

$\varphi_8(q_{70}, a) = q_{70}$ $\psi_8(q_{70}, a) = w$ za $a\in\{$ $b\in A|$ $b = a_0+a_1 2+a_2 2^2+a_3 2^3+a_4 2^4+a_5 2^5+a_6 2^6+a_7 2^7$, $a_6 = 1\}$,

$\varphi_8(q_{70}, a) = q_{F_0}$ $\psi_8(q_{70}, a) = 0$ inače,

$\varphi_8(q_{71}, a) = q_{71}$ $\psi_8(q_{71}, a) = w$ za $a\in\{246, 66, 98, 120, 80, 112, 106, 107, 255, 127, 254, 126, 214, 86, 118, 248, 240, 208, 70, 102, 110, 124, 116, 84, 252, 244, 212, 111\}$,

$\varphi_8(q_{71}, a) = q_{71}$ $\psi_8(q_{71}, a) = s$ za $a\in\{14, 46, 28, 60, 62, 30, 24, 56, 10, 42\}$,

$\varphi_8(q_{71}, a) = q_{72}$ $\psi_8(q_{71}, a) = e$ za $a\in\{11, 15, 31, 43, 47, 63\}$,

$\varphi_8(q_{71}, a) = q_{73}$ $\psi_8(q_{71}, a) = w$ za $a\in\{222, 78, 95, 223, 94, 74, 79, 75, 253, 221, 249, 217, 125, 92, 93, 121, 88, 89, 216, 220\}$,

$\varphi_8(q_{71}, a) = q_{F_0}$ $\psi_8(q_{71}, a) = 0$ inače,

$\varphi_8(q_{72}, a) = q_{71}$ $\psi_8(q_{72}, a) = s$ za $a\in\{126, 120, 106, 124, 252, 248, 110, 254\}$,

$\varphi_8(q_{72}, a) = q_{72}$ $\psi_8(q_{72}, a) = e$ za $a\in\{$ $b\in A|$ $b = a_0+a_1 2+a_2 2^2+a_3 2^3+a_4 2^4+a_5 2^5+a_6 2^6+a_7 2^7$, $a_1 = 1\}$,

$\varphi_8(q_{72}, a) = q_{F_0}$ $\psi_8(q_{72}, a) = 0$ inače,

$\varphi_8(q_{73}, a) = q_{73}$ $\psi_8(q_{73}, a) = w$ za $a\in\{$ $b\in A|$ $b = a_0+a_1 2+a_2 2^2+a_3 2^3+a_4 2^4+a_5 2^5+a_6 2^6+a_7 2^7$, $a_6 = 1\}$,

$\varphi_8(q_{73}, a) = q_{F_0}$ $\psi_8(q_{73}, a) = 0$ inače,

$\varphi_8(q_{74}, a) = q_{74}$ $\psi_8(q_{25}, a) = e$ za $a\in\{$ $b\in A|$ $b = a_0+a_1 2+a_2 2^2+a_3 2^3+a_4 2^4+a_5 2^5+a_6 2^6+a_7 2^7$, $a_1 = 1$, $a_4 = 0\}$,

$\varphi_8(q_{74}, a) = q_{74}$ $\psi_8(q_{74}, a) = n$ za $a\in\{$ $b\in A|$ $24\leq b\leq 31$ ili $56\leq b\leq 63$ ili $80\leq b\leq 95$ ili $112\leq b\leq 127\}$,

$\varphi_8(q_{74}, a) = q_{75}$ $\psi_8(q_{74}, a) = n$ za $a\in\{b\in A|$ $144\leq b\leq 159$ ili $184\leq b\leq 191\}$,

$\varphi_8(q_{74}, a) = q_{F_0}$ $\psi_8(q_{74}, a) = 0$ inače,

$\varphi_8(q_{75}, a) = q_{75}$ $\psi_8(q_{26}, a) = w$ za $a\in\{$ $b\in A|$ $64\leq b\leq 103$ ili $112\leq b\leq 119$ ili $192\leq b\leq 231$ ili $240\leq b\leq 247\}$,

$\varphi_8(q_{75}, a) = q_{75}$ $\psi_8(q_{75}, a) = n$ za $a\in\{$ $b\in A|$ $16\leq b\leq 29$ ili $b = 31$ ili $144\leq b\leq 159\}$,

$\varphi_8(q_{75}, a) = q_{76}$ $\psi_8(q_{75}, a) = w$ za $a\in\{106, 110, 122, 126, 234, 250, 254\}$,

$\varphi_8(q_{75}, a) = q_{79}$ $\psi_8(q_{75}, a) = e$ za $a\in\{10, 42\}$,

$\varphi_8(q_{75}, a) = q_{77}$ $\psi_8(q_{75}, a) = e$ za $a\in\{14, 30, 46, 62\}$,

$\varphi_8(q_{75}, a) = q_{F_0}$ $\psi_8(q_{75}, a) = 0$ inače,

$\varphi_8(q_{76}, a) = q_{76}$ $\psi_8(q_{76}, a) = w$ za $a\in\{107, 111, 127, 123, 235, 251, 255\}$,

$\varphi_8(q_{76}, a) = q_{77}$ $\psi_8(q_{76}, a) = e$ za $a\in\{15, 31, 63, 47\}$,

$\varphi_8(q_{76}, a) = q_{79}$ $\psi_8(q_{76}, a) = e$ za $a\in\{11, 43\}$,

$\varphi_8(q_{76}, a) = q_{F_0}$ $\psi_8(q_{76}, a) = 0$ inače,

$\varphi_8(q_{77}, a) = q_{77}$ $\psi_8(q_{77}, a) = e$ za $a\in\{254, 255, 246, 247, 214, 215, 126, 127, 118, 119, 86, 87\}$,

$\varphi_8(q_{77}, a) = q_{78}$ $\psi_8(q_{77}, a) = e$ za $a\in\{122, 123, 114, 115, 82, 83, 250, 251, 242, 243, 210, 211\}$,

$\varphi_8(q_{77}, a) = q_{80}$ $\psi_8(q_{77}, a) = e$ za $a\in\{95, 223\}$,

$\varphi_8(q_{77}, a) = q_{81}$ $\psi_8(q_{77}, a) = e$ za $a\in\{91, 219\}$,

$\varphi_8(q_{77}, a) = q_{85}$ $\psi_8(q_{77}, a) = n$ za $a\in\{216, 217\}$,

$\varphi_8(q_{77}, a) = q_{F_0}$ $\psi_8(q_{77}, a) = 0$ inače,

$\varphi_8(q_{78}, a) = q_{78}$ $\psi_8(q_{78}, a) = e$ za $a\in\{234, 235, 226, 227, 194, 195, 106, 107, 98, 99, 66, 67\}$,

$\varphi_8(q_{78}, a) = q_{81}$ $\psi_8(q_{78}, a) = e$ za $a\in\{203, 75\}$,

$\varphi_8(q_{78}, a) = q_{84}$ $\psi_8(q_{78}, a) = w$ za $a\in\{200, 201, 72, 73\}$,

$\varphi_8(q_{78}, a) = q_{F_0}$ $\psi_8(q_{78}, a) = 0$ inače,

$\varphi_8(q_{79}, a) = q_{79}$ $\psi_8(q_{79}, a) = e$ za $a\in\{66, 67, 98, 99, 106, 107\}$,

$\varphi_8(q_{79}, a) = q_{77}$ $\psi_8(q_{79}, a) = e$ za $a \in \{110, 111, 102, 103, 70, 71\}$,

$\varphi_8(q_{79}, a) = q_{F_1}$ $\psi_8(q_{79}, a) = 0$ za $a \in \{72, 73\}$,

$\varphi_8(q_{79}, a) = q_{80}$ $\psi_8(q_{79}, a) = e$ za $a = 79$,
$\varphi_8(q_{79}, a) = q_{82}$ $\psi_8(q_{79}, a) = e$ za $a = 75$,
$\varphi_8(q_{79}, a) = q_{F_0}$ $\psi_8(q_{79}, a) = 0$ inače.

$\varphi_8(q_{80}, a) = q_{85}$ $\psi_8(q_{80}, a) = n$ za $a \in \{248, 249\}$,
$\varphi_8(q_{80}, a) = q_{80}$ $\psi_8(q_{80}, a) = e$ za $a \in \{127, 255\}$,
$\varphi_8(q_{80}, a) = q_{81}$ $\psi_8(q_{80}, a) = e$ za $a \in \{123, 251\}$,
$\varphi_8(q_{80}, a) = q_{F_0}$ $\psi_8(q_{80}, a) = 0$ inače,

$\varphi_8(q_{81}, a) = q_{84}$ $\psi_8(q_{81}, a) = w$ za $a \in \{72, 73, 104, 105, 232, 233\}$,
$\varphi_8(q_{81}, a) = q_{81}$ $\psi_8(q_{81}, a) = e$ za $a \in \{107, 235\}$,
$\varphi_8(q_{81}, a) = q_{F_0}$ $\psi_8(q_{81}, a) = 0$ inače.

$\varphi_8(q_{82}, a) = q_{F_1}$ $\psi_8(q_{82}, a) = 0$ za $a \in \{104, 105\}$,
$\varphi_8(q_{82}, a) = q_{82}$ $\psi_8(q_{82}, a) = e$ za $a = 107$,
$\varphi_8(q_{82}, a) = q_{83}$ $\psi_8(q_{82}, a) = e$ za $a = 111$,
$\varphi_8(q_{82}, a) = q_{F_0}$ $\psi_8(q_{82}, a) = 0$ inače.

$\varphi_8(q_{83}, a) = q_{83}$ $\psi_8(q_{83}, a) = e$ za $a \in \{127, 255\}$,
$\varphi_8(q_{83}, a) = q_{85}$ $\psi_8(q_{83}, a) = n$ za $a \in \{248, 249\}$,
$\varphi_8(q_{83}, a) = q_{81}$ $\psi_8(q_{83}, a) = e$ za $a \in \{123, 251\}$,
$\varphi_8(q_{83}, a) = q_{F_0}$ $\psi_8(q_{83}, a) = 0$ inače.

$\varphi_8(q_{84}, a) = q_{85}$ $\psi_8(q_{84}, a) = n$ za $a \in \{210, 114, 115, 122, 123, 82, 242, 243, 250, 251, 219, 83, 211, 91\}$,
$\varphi_8(q_{84}, a) = q_{84}$ $\psi_8(q_{84}, a) = w$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_6 = 1\}$,
$\varphi_8(q_{84}, a) = q_{F_0}$ $\psi_8(q_{84}, a) = 0$ inače.

$\varphi_8(q_{85}, a) = q_{85}$ $\psi_8(q_{85}, a) = n$ za $a = 123$,
$\varphi_8(q_{85}, a) = q_{85}$ $\psi_8(q_{85}, a) = w$ za $a \in \{104, 105, 107, 232, 233, 235\}$,
$\varphi_8(q_{85}, a) = q_{86}$ $\psi_8(q_{85}, a) = w$ za $a \in \{248, 249, 251\}$,
$\varphi_8(q_{85}, a) = q_{89}$ $\psi_8(q_{85}, a) = s$ za $a = 41$,
$\varphi_8(q_{85}, a) = q_{F_1}$ $\psi_8(q_{85}, a) = 0$ za $a \in \{11, 43\}$,
$\varphi_8(q_{85}, a) = q_{F_0}$ $\psi_8(q_{85}, a) = 0$ inače.

$\varphi_8(q_{86}, a) = q_{86}$ $\psi_8(q_{86}, a) = w$ za $a = 255$,
$\varphi_8(q_{86}, a) = q_{88}$ $\psi_8(q_{86}, a) = e$ za $a \in \{31, 63\}$,
$\varphi_8(q_{86}, a) = q_{87}$ $\psi_8(q_{86}, a) = w$ za $a = 127$,
$\varphi_8(q_{86}, a) = q_{F_0}$ $\psi_8(q_{86}, a) = 0$ inače.

$\varphi_8(q_{87}, a) = q_{87}$ $\psi_8(q_{87}, a) = w$ za $a \in \{107, 111\}$,
$\varphi_8(q_{87}, a) = q_{88}$ $\psi_8(q_{87}, a) = e$ za $a \in \{11, 15, 43, 47\}$,
$\varphi_8(q_{87}, a) = q_{F_0}$ $\psi_8(q_{87}, a) = 0$ inače,

$\varphi_8(q_{88}, a) = q_{85}$ $\psi_8(q_{88}, a) = n$ za $a \in \{248, 249, 251\}$,
$\varphi_8(q_{88}, a) = q_{88}$ $\psi_8(q_{88}, a) = e$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 1\}$,
$\varphi_8(q_{88}, a) = q_{F_0}$ $\psi_8(q_{88}, a) = 0$ inače,

$\varphi_8(q_{89}, a) = q_{89}$ $\psi_8(q_{89}, a) = w$ za $a \in \{82, 83, 91, 114, 115, 122, 123, 70, 71, 79, 102, 103, 110, 111, 66, 67, 75, 98, 99, 106, 107\}$,
$\varphi_8(q_{89}, a) = q_{F_1}$ $\psi_8(q_{89}, a) = 0$ za $a \in \{10, 11, 14, 15, 42, 43, 46, 47\}$,
$\varphi_8(q_{89}, a) = q_{F_0}$ $\psi_8(q_{89}, a) = 0$ inače,

Neka je M = $\{194, 195, 198, 199, 202, 203, 206, 207, 226, 230, 234, 235, 238, 239\} \subseteq A$. Tada,

$\psi_{k8}(q_{k8}, (\{q_i\}, a)) = \psi_8(q_i, (\{q_{k8}\}, a))$ za $i \in \{1, 2, 3, 4, 5, 6\}$, $a \in A$,

$\psi_{k8}(q_{k8}, (\{q_7\}, a)) = 0$ $a \in M_1 = \{202, 206, 234, 238, 194, 198, 226, 230\} \subset M$,
$\psi_{k8}(q_{k8}, (\{q_7\}, a)) = \psi_8(q_7, (\{q_{k8}\}, a))$ za $a \notin M_1$,

$\psi_{k8}(q_{k8}, (\{q_8\}, a)) = 0$ $a \in M_1 = \{195, 194, 203, 239, 207, 235\} \subset M$,
$\psi_{k8}(q_{k8}, (\{q_8\}, a)) = \psi_8(q_8, (\{q_{k8}\}, a))$ za $a \notin M_1$,

$\psi_{k8}(q_{k8}, (\{q_9\}, a)) = 0$ $a \in M_1 = \{195, 194, 203, 239, 207, 235, 198, 199\} \subset M$,
$\psi_{k8}(q_{k8}, (\{q_9\}, a)) = \psi_8(q_9, (\{q_{k8}\}, a))$ za $a \notin M_1$,

$\varphi_8(q_{22}, (\{q_{k8}\}, a)) = q_{25}$ $\psi_8(q_{22}, (\{q_{k8}\}, a)) = e$ za $a \in M \setminus \{195, 199\}$

$\varphi_8(q_{22}, (\{\lambda\}, a)) = q_{F_0}$ $\psi_8(q_{22}, (\{\lambda\}, a)) = 0$ za $a \in M \setminus \{195, 199\}$, tj. ako se automati

A_8, K_8 ne susretnu,

$\varphi_8(q_{24}, (\{q_{k8}\}, a)) = q_{25}$ $\psi_{k8}(q_{k8}, (\{q_{24}\}, a)) = \psi_8(q_{24}, (\{q_{k8}\}, a)) = e$ za $a \in \{194, 195, 198, 199\} \subset M$,

$\varphi_8(q_{24}, (\{\lambda\}, a) = q_{F_0}$ $\psi_8(q_{24}, (\{\lambda\}, a) = 0$ za $a \in \{194, 195, 198, 199\}$, tj. ako se

automati A_8, K_8 ne susretnu.

Neka je M = $\{194, 195, 198, 199, 202, 203, 206, 207, 226, 227, 230, 231, 234, 235, 238, 239\} \subseteq A$. Tada,

$\psi_{k8}(q_{k8}, (\{q_i\}, a)) = \psi_8(q_i, (\{q_{k8}\}, a))$ za $i \in \{25, 26, \ldots, 47\}$, $a \in A$,

$\psi_{k8}(q_{k8}, (\{q_{48}\}, a)) = 0$ $a \in M \setminus \{202, 206\}$,

$\psi_{k8}(q_{k8}, (\{q_{48}\}, a)) = \psi_8(q_{48}, (\{q_{k8}\}, a))$ za $a \notin M \setminus \{202, 206\}$,

$\psi_{k8}(q_{k8}, (\{q_i\}, a)) = \psi_8(q_i, (\{q_{k8}\}, a))$ za $i \in \{50, 51, \ldots, 55\}$, $a \in A$,

$\psi_{k8}(q_{k8}, (\{q_{56}\}, a)) = 0$ $a \in M_1 = \{202, 206, 234, 238, 194, 198, 226, 230\} \subset M$,

$\psi_{k8}(q_{k8}, (\{q_{56}\}, a)) = \psi_8(q_{56}, (\{q_{k8}\}, a)) = \psi_8(q_{56}, a)$ za $a \notin M_1$,

$\psi_{k8}(q_{k8}, (\{q_{57}\}, a)) = 0$ $a \in M_1 = \{195, 194, 203, 239, 207, 235, 198, 199\} \subset M$,

$\psi_{k8}(q_{k8}, (\{q_{57}\}, a)) = \psi_8(q_{57}, (\{q_{k8}\}, a))$ za $a \notin M_1$,

$\psi_{k8}(q_{k8}, (\{q_{58}\}, a)) = 0$ $a \in M_1 = \{195, 194, 203, 239, 207, 235, 198, 199\} \subset M$,

$\psi_{k8}(q_{k8}, (\{q_{58}\}, a)) = \psi_8(q_{58}, (\{q_{k8}\}, a)) = \psi_8(q_{58}, a)$ za $a \notin M_1$,

$\psi_{k8}(q_{k8}, (\{q_{71}\}, a)) = 0$, $a \in A$

$\varphi_8(q_{71}, (\{q_{k8}\}, a)) = q_{74}$ $\psi_8(q_{71}, (\{q_{k8}\}, a)) = e$ za $a \in M \setminus \{195, 199, 227, 231\}$

$\varphi_8(q_{71}, (\{\lambda\}, a)) = q_{F_0}$ $\psi_8(q_{71}, (\{\lambda\}, a) = 0$ za $a \in M \setminus \{195, 199, 227, 231\}$, tj. ako se

automati A_8, K_8 ne susretnu,

$\psi_{k8}(q_{k8}, (\{q_{73}\}, a)) = 0$, $a \in A$

$\varphi_8(q_{73}, (\{q_{k8}\}, a)) = q_{74}$ $\psi_8(q_{73}, (\{q_{k8}\}, a)) = e$ za $a \in M$,

$\varphi_8(q_{73}, (\{\lambda\}, a) = q_{F_0}$ $\psi_8(q_{73}, (\{\lambda\}, a) = 0$ za $a \in M$, tj. ako se automati A_8, K_8 ne

susretnu.

Kolektiv $S_9 = (A_9, K_9)$ je definisan na sljedeći način:

$Q_6 = \{q_i \mid i \in \{1, \ldots, 79\}\} \cup Q_F$,

$\varphi_9(q_1, a) = q_2 \ \psi_9(q_1, a) = w$ za $a \in \{80, 112, 208, 240\}$,

$\varphi_9(q_1, a) = q_{F_0} \ \psi_9(q_1, a) = 0$ inače,

$\varphi_9(q_2, a) = q_6 \ \psi_9(q_2, a) = n$ za $a = 148$,

$\varphi_9(q_2, a) = q_3 \ \psi_9(q_2, a) = e$ za $a \in \{18, 22, 146, 150\}$,

$\varphi_9(q_2, a) = q_2 \ \psi_9(q_2, a) = s$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, \ a_0 = 0, a_3 = 1 \}$,

$\varphi_9(q_2, a) = q_2 \ \psi_9(q_2, a) = w$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, \ a_6 = 1, a_3 = 0 \}$,

$\varphi_9(q_2, a) = q_{F_0} \ \psi_9(q_2, a) = 0$ inače,

$\varphi_9(q_3, a) = q_4 \ \psi_9(q_3, a) = w$ za $a \in \{208, 212\}$,

$\varphi_9(q_3, a) = q_{11} \ \psi_9(q_3, a) = w$ za $a \in \{80, 84\}$,

$\varphi_9(q_3, a) = q_3 \ \psi_9(q_3, a) = e$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, \ a_1 = 1 \}$,

$\varphi_9(q_3, a) = q_{F_0} \ \psi_9(q_3, a) = 0$ inače,

$\varphi_9(q_4, a) = q_4 \ \psi_9(q_4, a) = w$ za $a \in \{255, 223, 214, 215, \}$,

$\varphi_9(q_4, a) = q_5 \ \psi_9(q_4, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_9(q_4, a) = q_{11} \ \psi_9(q_4, a) = w$ za $a \in \{127, 95, 86, 87\}$,

$\varphi_9(q_4, a) = q_{F_0} \ \psi_9(q_4, a) = 0$ inače,

$\varphi_9(q_5, a) = q_6 \ \psi_9(q_5, a) = n$ za $a \in \{208, 212, 240, 244, 248, 252\}$,

$\varphi_9(q_5, a) = q_5 \ \psi_9(q_5, a) = e$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, \ a_1 = 1 \}$,

$\varphi_9(q_5, a) = q_{F_0} \ \psi_9(q_5, a) = 0$ inače,

$\varphi_9(q_6, a) = q_7 \ \psi_9(q_6, a) = w$ za $a \in \{208, 212, 240, 244\}$,

$\varphi_9(q_6, a) = q_4 \ \psi_9(q_6, a) = w$ za $a \in \{248, 252\}$,

$\varphi_9(q_6, a) = q_8 \ \psi_9(q_6, a) = e$ za $a \in \{74, 78, 202, 94, 206, 218, 106, 110, 234, 126, 238, 250, 210, 242\}$,

$\varphi_9(q_6, a) = q_6 \ \psi_9(q_6, a) = e$ za $a \in \{214, 246, 222, 254\}$,

$\varphi_9(q_6, a) = q_{11} \ \psi_9(q_6, a) = w$ za $a \in \{120, 124\}$,

$\varphi_9(q_6, a) = q_{F_0} \ \psi_9(q_6, a) = 0$ inače,

$\varphi_9(q_7, a) = q_7 \ \psi_9(q_7, a) = w$ za $a \in \{214, 246\}$,

$\varphi_9(q_7, a) = q_4 \ \psi_9(q_7, a) = w$ za $a \in \{222, 254\}$,

$\varphi_9(q_7, a) = q_{F_0} \ \psi_9(q_7, a) = 0$ inače,

$\varphi_9(q_8, a) = q_8 \ \psi_9(q_8, a) = e$ za $a \in \{98, 102, 118, 246, 226, 230, 66, 70, 86, 214, 194, 198\}$,

$\varphi_9(q_8, a) = q_9 \ \psi_9(q_8, a) = w$ za $a \in \{112, 116, 244, 240, 80, 84, 208, 212\}$,

$\varphi_9(q_8, a) = q_{F_0} \ \psi_9(q_8, a) = 0$ inače,

$\varphi_9(q_9, a) = q_9 \ \psi_9(q_9, a) = w$ za $a \in \{98, 102, 118, 246, 66, 70, 86, 214, 242, 210, 226, 230, 194, 198, 146\}$,

$\varphi_9(q_9, a) = q_{10} \ \psi_9(q_9, a) = w$ za $a \in \{74, 78, 94, 218, 106, 110, 126, 250, 254, 222, 202, 206, 234, 238\}$,

$\varphi_9(q_9, a) = q_{F_0} \ \psi_9(q_9, a) = 0$ inače,

$\varphi_9(q_{10}, a) = q_{10} \ \psi_9(q_{10}, a) = w$ za $a \in \{255, 223, 215, 251, 219, 211, 71, 79, 111, 107, 75, 67, 214, 66, 210, 203, 207, 194, 195, 235, 239, 198, 199\}$,

$\varphi_9(q_{10}, a) = q_{12} \ \psi_9(q_{10}, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_9(q_{10}, a) = q_{13} \ \psi_9(q_{10}, a) = n$ za $a \in \{18, 19, 27, 146, 147, 155\}$,

$\varphi_9(q_{10}, a) = q_{F_0} \ \psi_9(q_{10}, a) = 0$ inače,

$\varphi_9(q_{11}, a) = q_{11} \ \psi_9(q_{11}, a) = w$ za $a \in \{211, 67, 210, 66, 255, 223, 70, 71, 107, 75, 215, 111, 79, 219, 251, 214, 194, 195, 198, 199, 203, 207, 235, 239\}$,

$\varphi_9(q_{11}, a) = q_{12} \ \psi_9(q_{11}, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_9(q_{11}, a) = q_{13} \ \psi_9(q_{11}, a) = n$ za $a \in \{18, 19, 27, 146, 147, 155\}$,

$\varphi_9(q_{11}, a) = q_{F_0} \ \psi_9(q_{11}, a) = 0$ inače,

$\varphi_9(q_{12}, a) = q_{13} \ \psi_9(q_{12}, a) = n$ za $a \in \{210, 211, 219, 218, 250, 251, 242\}$,

$\varphi_9(q_{12}, a) = q_{12} \ \psi_9(q_{12}, a) = e$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, \ a_1 = 1 \}$,

$\varphi_9(q_{12}, a) = q_{F_0} \ \psi_9(q_{12}, a) = 0$ inače,

$\varphi_9(q_{13}, a) = q_{13} \ \psi_9(q_{13}, a) = w$ za $a \in \{214, 66, 194, 210, 248, 104, 232, 203, 215, 211, 67, 195, 216, 200, 72, 255, 223, 251, 219, 107, 75, 235, 249, 233, 105, 217, 201, 73\}$,

$\varphi_9(q_{13}, a) = q_{13} \ \psi_9(q_{13}, a) = n$ za $a \in \{18, 19, 24, 25, 27, 146, 147, 152, 153, 155\}$,

$\varphi_9(q_{13}, a) = q_{14} \ \psi_9(q_{13}, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_9(q_{13}, a) = q_{15} \ \psi_9(q_{13}, a) = e$ za $a \in \{2, 3, 11\}$,

$\varphi_9(q_{13}, a) = q_{15} \ \psi_9(q_{13}, a) = s$ za $a \in \{8, 9\}$,

$\varphi_9(q_{13}, a) = q_{F_0}$ $\psi_9(q_{13}, a) = 0$ inače,

$\varphi_9(q_{14}, a) = q_{13}$ $\psi_9(q_{14}, a) = n$ za $a \in \{210, 211, 216, 217, 219, 248, 249, 251\}$,

$\varphi_9(q_{14}, a) = q_{14}$ $\psi_9(q_{14}, a) = e$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 1\}$,

$\varphi_9(q_{14}, a) = q_{F_0}$ $\psi_9(q_{14}, a) = 0$ inače,

$\varphi_9(q_{15}, a) = q_{16}$ $\psi_9(q_{15}, a) = n$ za $a \in \{127, 126, 94, 95, 86, 87, 80, 84, 112, 116, 120, 124\}$,

$\varphi_9(q_{15}, a) = q_{15}$ $\psi_9(q_{15}, a) = s$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_3 = 1, a_1 = 0\}$,

$\varphi_9(q_{15}, a) = q_{15}$ $\psi_9(q_{15}, a) = e$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 1\}$,

$\varphi_9(q_{15}, a) = q_{F_0}$ $\psi_9(q_{15}, a) = 0$ inače,

$\varphi_9(q_{16}, a) = q_{16}$ $\psi_9(q_{16}, a) = e$ za $a \in \{30, 10, 14, 214, 66, 70, 86, 11, 15, 31, 255, 254, 127, 126, 246, 118, 98, 102, 63, 47, 43, 42, 46, 62, 107, 111, 106, 110\}$,

$\varphi_9(q_{16}, a) = q_{16}$ $\psi_9(q_{16}, a) = n$ za $a \in \{56, 60, 120, 124, 112, 116, 24, 28, 80, 84\}$,

$\varphi_9(q_{16}, a) = q_{17}$ $\psi_9(q_{16}, a) = w$ za $a \in \{252, 248, 240, 244, 212, 208\}$,

$\varphi_9(q_{16}, a) = q_{18}$ $\psi_9(q_{16}, a) = e$ za $a \in \{190, 191, 158, 159\}$,

$\varphi_9(q_{16}, a) = q_{19}$ $\psi_9(q_{16}, a) = n$ za $a \in \{152, 184\}$,

$\varphi_9(q_{16}, a) = q_{F_0}$ $\psi_9(q_{16}, a) = 0$ inače,

$\varphi_9(q_{17}, a) = q_{16}$ $\psi_9(q_{17}, a) = n$ za $a \in \{62, 63, 126, 127, 118, 30, 31, 86\}$,

$\varphi_9(q_{17}, a) = q_{17}$ $\psi_9(q_{17}, a) = w$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_6 = 1\}$,

$\varphi_9(q_{17}, a) = q_{F_0}$ $\psi_9(q_{17}, a) = 0$ inače,

$\varphi_9(q_{18}, a) = q_{18}$ $\psi_9(q_{18}, a) = e$ za $a \in \{255, 254, 246, 214\}$,

$\varphi_9(q_{18}, a) = q_{19}$ $\psi_9(q_{18}, a) = n$ za $a \in \{208, 240, 248\}$,

$\varphi_9(q_{18}, a) = q_{F_0}$ $\psi_9(q_{18}, a) = 0$ inače,

$\varphi_9(q_{19}, a) = q_{19}$ $\psi_9(q_{19}, a) = w$ za $a \in \{216, 248, 255, 223, 215, 214, 246, 247\}$,

$\varphi_9(q_{19}, a) = q_{20}$ $\psi_9(q_{19}, a) = n$ za $a \in \{22, 23, 150, 151\}$,

$\varphi_9(q_{19}, a) = q_{22}$ $\psi_9(q_{19}, a) = w$ za $a \in \{118, 119, 120, 127, 95, 87, 86, 88\}$,

$\varphi_9(q_{19}, a) = q_{25}$ $\psi_9(q_{19}, a) = s$ za $a \in \{254, 222, 126, 94, 62, 30\}$,

$\varphi_9(q_{19}, a) = q_{F_0}$ $\psi_9(q_{19}, a) = 0$ inače,

$\varphi_9(q_{20}, a) = q_{21}$ $\psi_9(q_{20}, a) = w$ za $a = 248$,

$\varphi_9(q_{20}, a) = q_{34}$ $\psi_9(q_{20}, a) = w$ za $a = 120$,

$\varphi_9(q_{20}, a) = q_{20}$ $\psi_9(q_{20}, a) = e$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 1\}$,

$\varphi_9(q_{20}, a) = q_{F_0}$ $\psi_9(q_{20}, a) = 0$ inače,

$\varphi_9(q_{21}, a) = q_{20}$ $\psi_9(q_{21}, a) = n$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_9(q_{21}, a) = q_{21}$ $\psi_9(q_{21}, a) = w$ za $a \in \{255, 223, 215, 214\}$,

$\varphi_9(q_{21}, a) = q_{34}$ $\psi_9(q_{21}, a) = w$ za $a = 127$,

$\varphi_9(q_{21}, a) = q_{F_0}$ $\psi_9(q_{21}, a) = 0$ inače,

$\varphi_9(q_{22}, a) = q_{22}$ $\psi_9(q_{22}, a) = w$ za $a \in \{214, 246, 111, 239, 207, 79, 71, 103, 231, 199, 70, 102, 230, 198, 107, 235, 203, 75, 251, 219, 211, 243, 67, 195, 99, 227, 66, 194, 98, 226, 210, 242, 255, 223\}$,

$\varphi_9(q_{22}, a) = q_{23}$ $\psi_9(q_{22}, a) = e$ za $a \in \{18, 19, 146, 147, 22, 150\}$,

$\varphi_9(q_{22}, a) = q_{25}$ $\psi_9(q_{22}, a) = s$ za $a \in \{78, 206, 110, 238, 218, 250, 106, 42, 10, 74, 202, 234, 222, 254, 14, 46\}$,

$\varphi_9(q_{22}, a) = q_{F_0}$ $\psi_9(q_{22}, a) = 0$ inače,

$\varphi_9(q_{23}, a) = q_{23}$ $\psi_9(q_{23}, a) = e$ za $a \in \{214, 215, 211, 210, 223, 219, 255, 251\}$,

$\varphi_9(q_{23}, a) = q_{24}$ $\psi_9(q_{23}, a) = w$ za $a \in \{203, 207, 194, 195, 198, 199, 235, 239\}$,

$\varphi_9(q_{23}, a) = q_{F_0}$ $\psi_9(q_{23}, a) = 0$ inače,

$\varphi_9(q_{24}, a) = q_{36}$ $\psi_9(q_{24}, a) = n$ za $a \in \{18, 19, 146, 147, 210, 211, 219, 251\}$,

$\varphi_9(q_{24}, a) = q_{24}$ $\psi_9(q_{24}, a) = w$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_6 = 1\}$,

$\varphi_9(q_{24}, a) = q_{F_0}$ $\psi_9(q_{24}, a) = 0$ inače,

$\varphi_9(q_{25}, a) = q_{29}$ $\psi_9(q_{25}, a) = n$ za $a = 148$,

$\varphi_9(q_{25}, a) = q_{26}$ $\psi_9(q_{25}, a) = e$ za $a \in \{18, 22, 146, 150\}$,

$\varphi_9(q_{25}, a) = q_{25}$ $\psi_9(q_{25}, a) = s$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_3 = 1, a_0 = 0\}$,

$\varphi_9(q_{25}, a) = q_{25}$ $\psi_9(q_{25}, a) = w$ za $a \in \{ b \in A | b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_6 = 1, a_3 = 0\}$,

$\varphi_9(q_{25}, a) = q_{F_0}$ $\psi_9(q_{25}, a) = 0$ inače,

$\varphi_9(q_{26}, a) = q_{27}$ $\psi_9(q_{26}, a) = w$ za $a \in \{208, 212\}$,

$\varphi_9(q_{26}, a) = q_{34}$ $\psi_9(q_{26}, a) = w$ za $a \in \{80, 84\}$,

$\varphi_9(q_{26}, a) = q_{26}$ $\psi_9(q_{26}, a) = e$ za $a \in \{$ $b \in A|$ $b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7$, $a_1 = 1\}$,

$\varphi_9(q_{26}, a) = q_{F_0}$ $\psi_9(q_{26}, a) = 0$ inače,

$\varphi_9(q_{27}, a) = q_{27}$ $\psi_9(q_{27}, a) = w$ za $a \in \{255, 223, 214, 215, \}$,

$\varphi_9(q_{27}, a) = q_{28}$ $\psi_9(q_{27}, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_9(q_{27}, a) = q_{34}$ $\psi_9(q_{27}, a) = w$ za $a \in \{127, 95, 86, 87\}$,

$\varphi_9(q_{27}, a) = q_{F_0}$ $\psi_9(q_{27}, a) = 0$ inače,

$\varphi_9(q_{28}, a) = q_{29}$ $\psi_9(q_{28}, a) = n$ za $a \in \{208, 212, 240, 244, 248, 252\}$,

$\varphi_9(q_{28}, a) = q_{28}$ $\psi_9(q_{28}, a) = e$ za $a \in \{$ $b \in A|$ $b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7$, $a_1 = 1\}$,

$\varphi_9(q_{28}, a) = q_{F_0}$ $\psi_9(q_{28}, a) = 0$ inače,

$\varphi_9(q_{29}, a) = q_{30}$ $\psi_9(q_{29}, a) = w$ za $a \in \{208, 212, 240, 244\}$,

$\varphi_9(q_{29}, a) = q_{27}$ $\psi_9(q_{29}, a) = w$ za $a \in \{248, 252\}$,

$\varphi_9(q_{29}, a) = q_{31}$ $\psi_9(q_{29}, a) = e$ za $a \in \{74, 78, 202, 94, 206, 218, 106, 110, 234, 126, 238, 250, 210, 242\}$,

$\varphi_9(q_{29}, a) = q_{29}$ $\psi_9(q_{29}, a) = e$ za $a \in \{214, 246, 222, 254\}$,

$\varphi_9(q_{29}, a) = q_{37}$ $\psi_9(q_{29}, a) = e$ za $a \in \{215, 247\}$,

$\varphi_9(q_{29}, a) = q_{38}$ $\psi_9(q_{29}, a) = e$ za $a \in \{211, 243\}$,

$\varphi_9(q_{29}, a) = q_{F_0}$ $\psi_9(q_{29}, a) = 0$ inače,

$\varphi_9(q_{30}, a) = q_{30}$ $\psi_9(q_{30}, a) = w$ za $a \in \{214, 246\}$,

$\varphi_9(q_{30}, a) = q_{27}$ $\psi_9(q_{30}, a) = w$ za $a \in \{222, 254\}$,

$\varphi_9(q_{30}, a) = q_{F_0}$ $\psi_9(q_{30}, a) = 0$ inače,

$\varphi_9(q_{31}, a) = q_{31}$ $\psi_9(q_{31}, a) = e$ za $a \in \{98, 102, 118, 246, 226, 230, 66, 70, 86, 214, 194, 198\}$,

$\varphi_9(q_{31}, a) = q_{32}$ $\psi_9(q_{31}, a) = w$ za $a \in \{112, 116, 244, 240, 80, 84, 208, 212\}$,

$\varphi_9(q_{31}, a) = q_{38}$ $\psi_9(q_{31}, a) = e$ za $a \in \{99, 103, 119, 247, 227, 231, 195, 199, 67, 71, 87, 215\}$,

$\varphi_9(q_{31}, a) = q_{F_0}$ $\psi_9(q_{31}, a) = 0$ inače,

$\varphi_9(q_{32}, a) = q_{32}$ $\psi_9(q_{32}, a) = w$ za $a \in \{98, 102, 118, 246, 66, 70, 86, 214, 242, 210, 146\}$,

$\varphi_9(q_{32}, a) = q_{33}$ $\psi_9(q_{32}, a) = w$ za $a \in \{74, 78, 94, 218, 106, 110, 126, 250, 254, 222\}$,

$\varphi_9(q_{32}, a) = q_{32}$ $\psi_9(q_{32}, a) = w$ za $a \in \{226, 230, 194, 198\}$,

$\varphi_9(q_{32}, a) = q_{33}$ $\psi_9(q_{32}, a) = w$ za $a \in \{202, 206, 234, 238\}$,

$\varphi_9(q_{32}, a) = q_{F_0}$ $\psi_9(q_{32}, a) = 0$ inače,

$\varphi_9(q_{33}, a) = q_{33}$ $\psi_9(q_{33}, a) = w$ za $a \in \{255, 223, 215, 251, 219, 211, 71, 79, 111, 107, 75, 67, 214, 66, 210\}$,

$\varphi_9(q_{33}, a) = q_{35}$ $\psi_9(q_{33}, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_9(q_{33}, a) = q_{36}$ $\psi_9(q_{33}, a) = n$ za $a \in \{18, 19, 27, 146, 147, 155\}$,

$\varphi_9(q_{33}, a) = q_{33}$ $\psi_9(q_{33}, a) = w$ za $a \in \{203, 207, 194, 195, 235, 239\}$,

$\varphi_9(q_{33}, a) = q_{F_0}$ $\psi_9(q_{33}, a) = 0$ inače,

$\varphi_9(q_{34}, a) = q_{34}$ $\psi_{34}(q_9, a) = w$ za $a \in \{211, 67, 210, 66, 255, 223, 70, 71, 107, 75, 215, 111, 79, 219, 251, 214\}$,

$\varphi_9(q_{34}, a) = q_{35}$ $\psi_{34}(q_9, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_9(q_{34}, a) = q_{36}$ $\psi_{34}(q_9, a) = n$ za $a \in \{18, 19, 27, 146, 147, 155\}$,

$\varphi_9(q_{34}, a) = q_{34}$ $\psi_{34}(q_9, a) = w$ za $a \in \{194, 195, 198, 199, 203, 207, 235, 239\}$,

$\varphi_9(q_{34}, a) = q_{F_0}$ $\psi_{34}(q_9, a) = 0$ inače,

$\varphi_9(q_{35}, a) = q_{36}$ $\psi_9(q_{35}, a) = n$ za $a \in \{210, 211, 219, 218, 250, 251, 242\}$,

$\varphi_9(q_{35}, a) = q_{35}$ $\psi_9(q_{35}, a) = e$ za $a \in \{$ $b \in A|$ $b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7$, $a_1 = 1\}$,

$\varphi_9(q_{35}, a) = q_{F_0}$ $\psi_9(q_{35}, a) = 0$ inače,

$\varphi_9(q_{36}, a) = q_{36}$ $\psi_9(q_{36}, a) = w$ za $a \in \{214, 66, 194, 210, 248, 104, 232, 203, 215, 211, 67, 195, 216, 200, 72, 255, 223, 251, 219, 107, 75, 235, 249, 233, 105, 217, 201, 73\}$,

$\varphi_9(q_{36}, a) = q_{36}$ $\psi_9(q_{36}, a) = n$ za $a \in \{18, 19, 24, 25, 28, 29, 27, 146, 147, 152, 153, 155\}$,

$\varphi_9(q_{36}, a) = q_{45}$ $\psi_9(q_{36}, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_9(q_{36}, a) = q_{46}$ $\psi_9(q_{36}, a) = w$ za $a \in \{253, 125, 221, 93, 95, 127, 88, 92, 220, 252, 124, 120, 121, 89\}$,

$\varphi_9(q_{36}, a) = q_{48}$ $\psi_9(q_{36}, a) = e$ za $a \in \{10, 14, 30\}$,

$\varphi_9(q_{36}, a) = q_{F_0}$ $\psi_9(q_{36}, a) = 0$ inače,

$\varphi_9(q_{37}, a) = q_{37}$ $\psi_9(q_{37}, a) = e$ za $a \in \{223, 255\}$,

$\varphi_9(q_{37}, a) = q_{38}$ $\psi_9(q_{37}, a) = e$ za $a \in \{219, 251\}$,

$\varphi_9(q_{37}, a) = q_{43}$ $\psi_9(q_{37}, a) = w$ za $a \in \{216, 248\}$,

$\varphi_9(q_{37}, a) = q_{F_0}$ $\psi_9(q_{37}, a) = 0$ inače,

$\varphi_9(q_{38}, a) = q_{38}$ $\psi_9(q_{38}, a) = e$ za $a \in \{235, 239, 75, 79, 95, 223, 107, 111, 127, 255, 203, 207\}$,

$\varphi_9(q_{38}, a) = q_{39}$ $\psi_9(q_{38}, a) = w$ za $a \in \{88, 120, 248, 216\}$,

$\varphi_9(q_{38}, a) = q_{F_0}$ $\psi_9(q_{38}, a) = 0$ inače,

$\varphi_9(q_{39}, a) = q_{39}$ $\psi_9(q_{39}, a) = w$ za $a \in \{98, 102, 118, 246, 247, 66, 70, 86, 214, 255, 127, 111, 107, 223, 95, 75, 79, 67, 71, 87, 215, 103, 119, 99\}$,

$\varphi_9(q_{39}, a) = q_{33}$ $\psi_9(q_{39}, a) = w$ za $a \in \{74, 78, 94, 106, 110, 126, 218, 250, 254, 222\}$,

$\varphi_9(q_{39}, a) = q_{39}$ $\psi_9(q_{39}, a) = w$ za $a \in \{194, 198, 227, 231, 195, 199, 226, 230\}$,

$\varphi_9(q_{39}, a) = q_{33}$ $\psi_9(q_{39}, a) = w$ za $a \in \{202, 206, 234, 238\}$,

$\varphi_9(q_{39}, a) = q_{40}$ $\psi_9(q_{39}, a) = w$ za $a \in \{203, 207, 235, 239\}$,

$\varphi_9(q_{39}, a) = q_{F_0}$ $\psi_9(q_{39}, a) = 0$ inače,

$\varphi_9(q_{40}, a) = q_{40}$ $\psi_9(q_{40}, a) = w$ za $a \in \{219, 251, 255, 223, 243, 211, 214, 246, 247, 215\}$,

$\varphi_9(q_{40}, a) = q_{41}$ $\psi_9(q_{40}, a) = w$ za $a \in \{222, 254\}$,

$\varphi_9(q_{40}, a) = q_{F_0}$ $\psi_9(q_{40}, a) = 0$ inače,

$\varphi_9(q_{41}, a) = q_{41}$ $\psi_9(q_{41}, a) = w$ za $a \in \{255, 223, 214, 215\}$,

$\varphi_9(q_{41}, a) = q_{42}$ $\psi_9(q_{41}, a) = e$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_9(q_{41}, a) = q_{F_0}$ $\psi_9(q_{41}, a) = 0$ inače,

$\varphi_9(q_{42}, a) = q_{36}$ $\psi_9(q_{42}, a) = n$ za $a \in \{251, 243, 219, 211\}$,

$\varphi_9(q_{42}, a) = q_{42}$ $\psi_9(q_{42}, a) = e$ za $a \in \{b \in A | \ b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, \ a_1 = 1\}$,

$\varphi_9(q_{42}, a) = q_{F_0}$ $\psi_9(q_{42}, a) = 0$ inače,

$\varphi_9(q_{43}, a) = q_{43}$ $\psi_9(q_{43}, a) = w$ za $a \in \{255, 223, 215, 214, 247, 246\}$,

$\varphi_9(q_{43}, a) = q_{44}$ $\psi_9(q_{43}, a) = w$ za $a \in \{222, 254\}$,

$\varphi_9(q_{43}, a) = q_{F_0}$ $\psi_9(q_{43}, a) = 0$ inače,

$\varphi_9(q_{44}, a) = q_{44}$ $\psi_9(q_{44}, a) = w$ za $a \in \{214, 215, 223, 255\}$,

$\varphi_9(q_{44}, a) = q_{34}$ $\psi_9(q_{44}, a) = w$ za $a \in \{127, 95, 86, 87\}$,

$\varphi_9(q_{44}, a) = q_{20}$ $\psi_9(q_{44}, a) = n$ za $a \in \{22, 23, 31, 150, 151, 159\}$,

$\varphi_9(q_{44}, a) = q_{F_0}$ $\psi_9(q_{44}, a) = 0$ inače,

$\varphi_9(q_{45}, a) = q_{36}$ $\psi_9(q_{45}, a) = n$ za $a \in \{210, 211, 216, 217, 219, 248, 249, 251\}$,

$\varphi_9(q_{45}, a) = q_{45}$ $\psi_9(q_{45}, a) = e$ za $a \in \{b \in A | \ b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, \ a_1 = 1\}$,

$\varphi_9(q_{45}, a) = q_{F_0}$ $\psi_9(q_{45}, a) = 0$ inače,

$\varphi_9(q_{46}, a) = q_{46}$ $\psi_9(q_{46}, a) = w$ za $a \in \{107, 111, 214, 223, 255, 127, 215, 95\}$,

$\varphi_9(q_{46}, a) = q_{47}$ $\psi_9(q_{46}, a) = e$ za $a \in \{11, 15, 7, 43, 47\}$,

$\varphi_9(q_{46}, a) = q_{48}$ $\psi_9(q_{46}, a) = n$ za $a \in \{22, 23, 31, 63\}$,

$\varphi_9(q_{46}, a) = q_{F_0}$ $\psi_9(q_{46}, a) = 0$ inače,

$\varphi_9(q_{47}, a) = q_{47}$ $\psi_9(q_{47}, a) = e$ za $a \in \{107, 111, 79\}$,

$\varphi_9(q_{47}, a) = q_{48}$ $\psi_9(q_{47}, a) = n$ za $a \in \{88, 89, 92, 93, 95, 125, 127, 120, 121, 124\}$,

$\varphi_9(q_{47}, a) = q_{F_0}$ $\psi_9(q_{47}, a) = 0$ inače,

$\varphi_9(q_{48}, a) = q_{48}$ $\psi_9(q_{48}, a) = e$ za $a \in \{246, 63, 30, 10, 14, 110, 111, 214, 66, 70, 86, 254, 126, 127, 106, 107, 43, 47, 62, 46, 42, 255, 31, 15, 11, 118, 98, 102\}$,

$\varphi_9(q_{48}, a) = q_{48}$ $\psi_9(q_{48}, a) = n$ za $a \in \{56, 60, 124, 120, 24, 28, 112, 116, 80, 84\}$,

$\varphi_9(q_{48}, a) = q_{49}$ $\psi_9(q_{48}, a) = w$ za $a \in \{208, 212, 240, 244, 248, 252\}$,

$\varphi_9(q_{48}, a) = q_{50}$ $\psi_9(q_{48}, a) = e$ za $a \in \{242, 247, 243, 119, 114, 115, 103, 99, 250, 251, 122, 123, 215, 210, 211, 67, 71, 87, 82, 83\}$,

$\varphi_9(q_{48}, a) = q_{F_0}$ $\psi_9(q_{48}, a) = 0$ inače,

$\varphi_9(q_{49}, a) = q_{48}$ $\psi_9(q_{49}, a) = n$ za $a \in \{30, 31, 62, 63, 86, 118, 126, 127\}$,

$\varphi_9(q_{49}, a) = q_{49}$ $\psi_9(q_{49}, a) = w$ za $a \in \{b \in A | \ b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, \ a_6 = 1\}$,

$\varphi_9(q_{49}, a) = q_{F_0}$ $\psi_9(q_{49}, a) = 0$ inače,

$\varphi_9(q_{50}, a) = q_{50}$ $\psi_9(q_{50}, a) = e$ za $a \in \{66, 67, 106, 107, 98, 99, 194, 195, 226, 227, 234, 235\}$,

$\varphi_9(q_{50}, a) = q_{51}$ $\psi_9(q_{50}, a) = s$ za $a \in \{223, 219, 216, 217, 200, 201, 203, 91, 95, 75, 79, 72, 73\}$,

$\varphi_9(q_{50}, a) = q_{F_0}$ $\psi_9(q_{50}, a) = 0$ inače,

$\varphi_9(q_{51}, a) = q_{51}$ $\psi_9(q_{51}, a) = e$ za $a \in \{107, 66, 67, 75, 31, 22, 23, 235, 203, 194, 195, 27, 18, 19, 255, 251, 223, 219, 214, 210, 215, 211, 159, 151, 150, 155, 146, 147\}$,

$\varphi_9(q_{51}, a) = q_{51}$ $\psi_9(q_{51}, a) = s$ za $a \in \{24, 25, 72, 73, 152, 153, 216, 217, 200, 201, 184, 56\}$,

$\varphi_9(q_{51}, a) = q_{52}$ $\psi_9(q_{51}, a) = w$ za $a \in \{104, 105, 232, 233, 248, 249\}$,

$\varphi_9(q_{51}, a) = q_{53}$ $\psi_9(q_{51}, a) = e$ za $a \in \{63, 59, 187, 191\}$,

$\varphi_9(q_{51}, a) = q_{54}$ $\psi_9(q_{51}, a) = w$ za $a = 120$,

$\varphi_9(q_{51}, a) = q_{58}$ $\psi_9(q_{51}, a) = w$ za $a = 88$,

$\varphi_9(q_{51}, a) = q_{56}$ $\psi_9(q_{51}, a) = e$ za $a \in \{30, 158, 254, 62\}$,

$\varphi_9(q_{51}, a) = q_{F_0}$ $\psi_9(q_{51}, a) = 0$ inače,

$\varphi_9(q_{52}, a) = q_{51}$ $\psi_9(q_{52}, a) = s$ za $a \in \{223, 219, 203, 75, 31, 159, 27, 155\}$,

$\varphi_9(q_{52}, a) = q_{52}$ $\psi_9(q_{52}, a) = w$ za $a \in \{$ b$\in$A| b = $a_0+a_12+a_22^2+a_32^3+a_42^4+a_52^5+a_62^6+a_72^7$, $a_6 = 1\}$,

$\varphi_9(q_{52}, a) = q_{F_0}$ $\psi_9(q_{52}, a) = 0$ inače,

$\varphi_9(q_{53}, a) = q_{53}$ $\psi_9(q_{53}, a) = e$ za $a \in \{255, 251, 235, 214\}$,

$\varphi_9(q_{53}, a) = q_{54}$ $\psi_9(q_{53}, a) = s$ za $a \in \{248, 104, 232\}$,

$\varphi_9(q_{53}, a) = q_{F_0}$ $\psi_9(q_{53}, a) = 0$ inače,

$\varphi_9(q_{54}, a) = q_{54}$ $\psi_9(q_{54}, a) = w$ za $a \in \{248, 255, 127, 111, 107\}$,

$\varphi_9(q_{54}, a) = q_{58}$ $\psi_9(q_{54}, a) = w$ za $a \in \{223, 79, 75, 95\}$,

$\varphi_9(q_{54}, a) = q_{55}$ $\psi_9(q_{54}, a) = e$ za $a \in \{31, 11, 15, 43, 47, 63\}$,

$\varphi_9(q_{54}, a) = q_{64}$ $\psi_9(q_{54}, a) = e$ za $a \in \{235, 239, 203, 207\}$,

$\varphi_9(q_{54}, a) = q_{F_0}$ $\psi_9(q_{54}, a) = 0$ inače,

$\varphi_9(q_{55}, a) = q_{55}$ $\psi_9(q_{55}, a) = e$ za $a \in \{255, 127, 107, 111\}$,

$\varphi_9(q_{55}, a) = q_{54}$ $\psi_9(q_{55}, a) = s$ za $a \in \{120, 248\}$,

$\varphi_9(q_{55}, a) = q_{F_0}$ $\psi_9(q_{55}, a) = 0$ inače,

$\varphi_9(q_{56}, a) = q_{56}$ $\psi_9(q_{56}, a) = e$ za $a \in \{247, 246, 223, 214, 215, 255\}$,

$\varphi_9(q_{56}, a) = q_{57}$ $\psi_9(q_{56}, a) = w$ za $a \in \{216, 248\}$,

$\varphi_9(q_{56}, a) = q_{F_0}$ $\psi_9(q_{56}, a) = 0$ inače,

$\varphi_9(q_{57}, a) = q_{57}$ $\psi_9(q_{57}, a) = w$ za $a \in \{247, 246, 223, 214, 215, 255\}$,

$\varphi_9(q_{57}, a) = q_{61}$ $\psi_9(q_{57}, a) = s$ za $a \in \{62, 30, 158, 254\}$,

$\varphi_9(q_{57}, a) = q_{F_0}$ $\psi_9(q_{57}, a) = 0$ inače,

$\varphi_9(q_{58}, a) = q_{58}$ $\psi_9(q_{58}, a) = w$ za $a \in \{111, 255, 127, 215, 87, 119, 247, 70, 102, 107, 71, 103, 67, 99, 214, 86, 246, 118, 110, 126, 254, 66, 98, 106\}$,

$\varphi_9(q_{58}, a) = q_{61}$ $\psi_9(q_{58}, a) = s$ za $a \in \{10, 42, 46, 14, 62, 30\}$,

$\varphi_9(q_{58}, a) = q_{59}$ $\psi_9(q_{58}, a) = e$ za $a \in \{43, 11, 47, 15, 31, 63\}$,

$\varphi_9(q_{58}, a) = q_{60}$ $\psi_9(q_{58}, a) = w$ za $a \in \{78, 94, 222, 74, 79, 223, 95, 75\}$,

$\varphi_9(q_{58}, a) = q_{64}$ $\psi_9(q_{58}, a) = e$ za $a \in \{235, 203, 207, 239, 194, 226, 202, 234, 198, 230, 206, 238, 199, 231, 195, 227\}$,

$\varphi_9(q_{58}, a) = q_{F_0}$ $\psi_9(q_{58}, a) = 0$ inače,

$\varphi_9(q_{59}, a) = q_{61}$ $\psi_9(q_{59}, a) = s$ za $a \in \{110, 126, 254, 106\}$,

$\varphi_9(q_{59}, a) = q_{59}$ $\psi_9(q_{59}, a) = e$ za $a \in \{$ b$\in$A| b = $a_0+a_12+a_22^2+a_32^3+a_42^4+a_52^5+a_62^6+a_72^7$, $a_1 = 1\}$,

$\varphi_9(q_{59}, a) = q_{F_0}$ $\psi_9(q_{59}, a) = 0$ inače,

$\varphi_9(q_{60}, a) = q_{60}$ $\psi_9(q_{60}, a) = w$ za $a \in \{70, 66, 214, 86, 67, 71, 215, 87\}$,

$\varphi_9(q_{60}, a) = q_{64}$ $\psi_9(q_{60}, a) = e$ za $a \in \{194, 195, 198, 199\}$,

$\varphi_9(q_{60}, a) = q_{F_0}$ $\psi_9(q_{60}, a) = 0$ inače,

$\varphi_9(q_{61}, a) = q_{61}$ $\psi_9(q_{61}, a) = w$ za $a \in \{246, 66, 98, 120, 80, 112, 106, 107, 255, 127, 254, 126, 214, 86, 118, 248, 240, 208, 70, 102, 110, 124, 116, 84, 252, 244, 212, 111\}$,

$\varphi_9(q_{61}, a) = q_{61}$ $\psi_9(q_{61}, a) = s$ za $a \in \{14, 46, 28, 60, 62, 30, 24, 56, 10, 42\}$,

$\varphi_9(q_{61}, a) = q_{62}$ $\psi_9(q_{61}, a) = e$ za $a \in \{11, 15, 31, 43, 47, 63\}$,

$\varphi_9(q_{61}, a) = q_{63}$ $\psi_9(q_{61}, a) = w$ za $a \in \{222, 78, 95, 223, 94, 74, 79, 75\}$,

$\varphi_9(q_{61}, a) = q_{64}$ $\psi_9(q_{61}, a) = e$ za $a \in \{235, 203, 226, 194, 202, 234, 198, 230, 206, 238, 207, 239\}$,

$\varphi_9(q_{61}, a) = q_{F_0}$ $\psi_9(q_{61}, a) = 0$ inače,

$\varphi_9(q_{62}, a) = q_{61}$ $\psi_9(q_{62}, a) = s$ za $a \in \{126, 120, 106, 124, 252, 248, 110, 254\}$,

$\varphi_9(q_{62}, a) = q_{62}$ $\psi_9(q_{62}, a) = e$ za $a \in \{$ b$\in$A| b = $a_0+a_12+a_22^2+a_32^3+a_42^4+a_52^5+a_62^6+a_72^7$, $a_1 = 1\}$,

$\varphi_9(q_{62}, a) = q_{F_0}$ $\psi_9(q_{62}, a) = 0$ inače,

$\varphi_9(q_{63}, a) = q_{63}$ $\psi_9(q_{63}, a) = w$ za $a \in \{215, 87, 67, 71, 214, 86, 70, 66\}$,

$\varphi_9(q_{63}, a) = q_{F_0}$ $\psi_9(q_{63}, a) = 0$ inače,

$\varphi_9(q_{64}, a) = q_{64}$ $\psi_9(q_{64}, a) = e$ za $a \in \{\ b \in A|\ b = a_0+a_1 2+a_2 2^2+a_3 2^3+a_4 2^4+a_5 2^5+a_6 2^6+a_7 2^7,\ a_1 = 1, a_4 = 0\}$,
$\varphi_9(q_{64}, a) = q_{64}$ $\psi_9(q_{64}, a) = n$ za $a \in \{\ b \in A|\ 24 \le b \le 31$ ili $56 \le b \le 63$ ili $80 \le b \le 95$ ili $112 \le b \le 127\}$,
$\varphi_9(q_{64}, a) = q_{65}$ $\psi_9(q_{64}, a) = n$ za $a \in \{b \in A|\ 144 \le b \le 159$ ili $184 \le b \le 191\}$,
$\varphi_9(q_{64}, a) = q_{F_0}$ $\psi_9(q_{64}, a) = 0$ inače,

$\varphi_9(q_{65}, a) = q_{65}$ $\psi_9(q_{65}, a) = w$ za $a \in \{\ b \in A|\ 64 \le b \le 103$ ili $112 \le b \le 119$ ili $192 \le b \le 231$ ili $240 \le b \le 247\}$,
$\varphi_9(q_{65}, a) = q_{65}$ $\psi_9(q_{65}, a) = n$ za $a \in \{\ b \in A|\ 16 \le b \le 29$ ili $b = 31$ ili $144 \le b \le 159\}$,
$\varphi_9(q_{65}, a) = q_{66}$ $\psi_9(q_{65}, a) = w$ za $a \in \{106, 110, 122, 126, 234, 250, 254\}$,
$\varphi_9(q_{65}, a) = q_{69}$ $\psi_9(q_{65}, a) = e$ za $a \in \{10, 42\}$,
$\varphi_9(q_{65}, a) = q_{67}$ $\psi_9(q_{65}, a) = e$ za $a \in \{14, 30, 46, 62\}$,
$\varphi_9(q_{65}, a) = q_{F_0}$ $\psi_9(q_{65}, a) = 0$ inače,

$\varphi_9(q_{66}, a) = q_{66}$ $\psi_9(q_{66}, a) = w$ za $a \in \{107, 111, 127, 123, 235, 251, 255\}$,
$\varphi_9(q_{66}, a) = q_{67}$ $\psi_9(q_{66}, a) = e$ za $a \in \{15, 31, 63, 47\}$,
$\varphi_9(q_{66}, a) = q_{69}$ $\psi_9(q_{66}, a) = e$ za $a \in \{11, 43\}$,
$\varphi_9(q_{66}, a) = q_{F_0}$ $\psi_9(q_{66}, a) = 0$ inače,

$\varphi_9(q_{67}, a) = q_{68}$ $\psi_9(q_{67}, a) = e$ za $a \in \{254, 255, 246, 247, 214, 215, 126, 127, 118, 119, 86, 87\}$,
$\varphi_9(q_{67}, a) = q_{68}$ $\psi_9(q_{67}, a) = e$ za $a \in \{122, 123, 114, 115, 82, 83, 250, 251, 242, 243, 210, 211\}$,
$\varphi_9(q_{67}, a) = q_{70}$ $\psi_9(q_{67}, a) = e$ za $a \in \{95, 223\}$,
$\varphi_9(q_{67}, a) = q_{71}$ $\psi_9(q_{67}, a) = e$ za $a \in \{91, 219\}$,
$\varphi_9(q_{67}, a) = q_{75}$ $\psi_9(q_{67}, a) = n$ za $a \in \{216, 217\}$,
$\varphi_9(q_{67}, a) = q_{F_0}$ $\psi_9(q_{67}, a) = 0$ inače,

$\varphi_9(q_{68}, a) = q_{68}$ $\psi_9(q_{68}, a) = e$ za $a \in \{234, 235, 226, 227, 194, 195, 106, 107, 98, 99, 66, 67\}$,
$\varphi_9(q_{68}, a) = q_{71}$ $\psi_9(q_{68}, a) = e$ za $a \in \{203, 75\}$,
$\varphi_9(q_{68}, a) = q_{74}$ $\psi_9(q_{68}, a) = w$ za $a \in \{200, 201, 72, 73\}$,
$\varphi_9(q_{68}, a) = q_{F_0}$ $\psi_9(q_{68}, a) = 0$ inače,

$\varphi_9(q_{69}, a) = q_{69}$ $\psi_9(q_{69}, a) = e$ za $a \in \{66, 67, 98, 99, 106, 107\}$,

$\varphi_9(q_{69}, a) = q_{67}$ $\psi_9(q_{69}, a) = e$ za $a \in \{110, 111, 102, 103, 70, 71\}$,
$\varphi_9(q_{69}, a) = q_{F_1}$ $\psi_9(q_{69}, a) = 0$ za $a \in \{72, 73\}$,
$\varphi_9(q_{69}, a) = q_{70}$ $\psi_9(q_{69}, a) = e$ za $a = 79$,
$\varphi_9(q_{69}, a) = q_{72}$ $\psi_9(q_{69}, a) = e$ za $a = 75$,
$\varphi_9(q_{69}, a) = q_{F_0}$ $\psi_9(q_{69}, a) = 0$ inače,

$\varphi_9(q_{70}, a) = q_{75}$ $\psi_9(q_{70}, a) = n$ za $a \in \{248, 249\}$,
$\varphi_9(q_{70}, a) = q_{70}$ $\psi_9(q_{70}, a) = e$ za $a \in \{127, 255\}$,
$\varphi_9(q_{70}, a) = q_{71}$ $\psi_9(q_{70}, a) = e$ za $a \in \{123, 251\}$,
$\varphi_9(q_{70}, a) = q_{F_0}$ $\psi_9(q_{70}, a) = 0$ inače,

$\varphi_9(q_{71}, a) = q_{74}$ $\psi_9(q_{71}, a) = w$ za $a \in \{72, 73, 104, 105, 232, 233\}$,
$\varphi_9(q_{71}, a) = q_{71}$ $\psi_9(q_{71}, a) = e$ za $a \in \{107, 235\}$,
$\varphi_9(q_{71}, a) = q_{F_0}$ $\psi_9(q_{71}, a) = 0$ inače,

$\varphi_9(q_{72}, a) = q_{72}$ $\psi_9(q_{72}, a) = 1$ za $a \in \{104, 105\}$,
$\varphi_9(q_{72}, a) = q_{72}$ $\psi_9(q_{72}, a) = e$ za $a = 107$,
$\varphi_9(q_{72}, a) = q_{73}$ $\psi_9(q_{72}, a) = e$ za $a = 111$,
$\varphi_9(q_{72}, a) = q_{F_0}$ $\psi_9(q_{72}, a) = 0$ inače,

$\varphi_9(q_{73}, a) = q_{73}$ $\psi_9(q_{73}, a) = e$ za $a \in \{127, 255\}$,
$\varphi_9(q_{73}, a) = q_{75}$ $\psi_9(q_{73}, a) = n$ za $a \in \{248, 249\}$,
$\varphi_9(q_{73}, a) = q_{71}$ $\psi_9(q_{73}, a) = e$ za $a \in \{123, 251\}$,
$\varphi_9(q_{73}, a) = q_{F_0}$ $\psi_9(q_{73}, a) = 0$ inače.

$\varphi_9(q_{74}, a) = q_{75}$ $\psi_9(q_{74}, a) = n$ za $a \in \{210, 114, 115, 122, 123, 82, 242, 243, 250, 251, 219, 83, 211, 91\}$,
$\varphi_9(q_{74}, a) = q_{74}$ $\psi_9(q_{74}, a) = w$ za $a \in \{\ b \in A|\ b = a_0+a_1 2+a_2 2^2+a_3 2^3+a_4 2^4+a_5 2^5+a_6 2^6+a_7 2^7,\ a_6 = 1\}$,
$\varphi_9(q_{74}, a) = q_{F_0}$ $\psi_9(q_{74}, a) = 0$ inače,

$\varphi_9(q_{75}, a) = q_{75}$ $\psi_9(q_{75}, a) = n$ za $a = 123$,
$\varphi_9(q_{75}, a) = q_{75}$ $\psi_9(q_{75}, a) = w$ za $a \in \{104, 105, 107, 232, 233, 235\}$,
$\varphi_9(q_{75}, a) = q_{76}$ $\psi_9(q_{75}, a) = w$ za $a \in \{248, 249, 251\}$,
$\varphi_9(q_{75}, a) = q_{79}$ $\psi_9(q_{75}, a) = s$ za $a = 41$,
$\varphi_9(q_{75}, a) = q_{F_1}$ $\psi_9(q_{75}, a) = 0$ za $a \in \{11, 43\}$,
$\varphi_9(q_{75}, a) = q_{F_0}$ $\psi_9(q_{75}, a) = 0$ inače,

$\varphi_9(q_{76}, a) = q_{76}$ $\psi_9(q_{76}, a) = w$ za $a = 255$,
$\varphi_9(q_{76}, a) = q_{78}$ $\psi_9(q_{76}, a) = e$ za $a \in \{31, 63\}$,
$\varphi_9(q_{76}, a) = q_{77}$ $\psi_9(q_{76}, a) = w$ za $a = 127$,
$\varphi_9(q_{76}, a) = q_{F_0}$ $\psi_9(q_{76}, a) = 0$ inače,

$\varphi_9(q_{77}, a) = q_{77}$ $\psi_9(q_{77}, a) = w$ za $a \in \{107, 111\}$,

$\varphi_9(q_{77}, a) = q_{78}$ $\psi_9(q_{77}, a) = e$ za $a \in \{11, 15, 43, 47\}$,

$\varphi_9(q_{77}, a) = q_{F_0}$ $\psi_9(q_{77}, a) = 0$ inače,

$\varphi_9(q_{78}, a) = q_{75}$ $\psi_9(q_{78}, a) = n$ za $a \in \{248, 249, 251\}$,

$\varphi_9(q_{78}, a) = q_{78}$ $\psi_9(q_{78}, a) = e$ za $a \in \{b \in A| b = a_0 + a_1 2 + a_2 2^2 + a_3 2^3 + a_4 2^4 + a_5 2^5 + a_6 2^6 + a_7 2^7, a_1 = 1\}$,

$\varphi_9(q_{78}, a) = q_{F_0}$ $\psi_9(q_{78}, a) = 0$ inače.

$\varphi_9(q_{79}, a) = q_{79}$ $\psi_9(q_{79}, a) = w$ za $a \in \{82, 83, 91, 114, 115, 122, 123, 70, 71, 79, 102, 103, 110, 111, 66, 67, 75, 98, 99, 106, 107\}$,

$\varphi_9(q_{79}, a) = q_{F_1}$ $\psi_9(q_{79}, a) = 0$ za $a \in \{10, 11, 14, 15, 42, 43, 46, 47\}$,

$\varphi_9(q_{79}, a) = q_{F_0}$ $\psi_9(q_{79}, a) = 0$ inače.

Neka je M = {194, 195, 198, 199, 202, 203, 206, 207, 226, 227, 230, 231, 234, 235, 238, 239}⊆A. Tada,

$\psi_{k9}(q_{k9}, (\{q_i\}, a)) = \psi_9(q_i, (\{q_{k9}\}, a))$ za $i \in \{1, 2, \ldots, 22\}$, $a \in A$,

$\psi_{k9}(q_{k9}, (\{q_{23}\}, a)) = 0$ $a \in M_1 = \{203, 207, 194, 195, 198, 199, 235, 239\} \subset M$,
$\psi_{k9}(q_{k9}, (\{q_{23}\}, a)) = \psi_9(q_{23}, (\{q_{k9}\}, a))$ za $a \notin M_1$,

$\psi_{k9}(q_{k9}, (\{q_i\}, a)) = \psi_9(q_i, (\{q_{k9}\}, a))$ za $i \in \{24, 25, \ldots, 31\}$, $a \in A$,

$\psi_{k9}(q_{k9}, (\{q_{32}\}, a)) = 0$ $a \in M_1 = \{202, 206, 194, 198, 234, 238, 226, 230\} \subset M$,
$\psi_{k9}(q_{k9}, (\{q_{32}\}, a)) = \psi_9(q_{32}, (\{q_{k9}\}, a))$ za $a \notin M_1$,

$\psi_{k9}(q_{k9}, (\{q_{33}\}, a)) = 0$ $a \in M_1 = \{195, 194, 203, 239, 207, 235\} \subset M$,
$\psi_{k9}(q_{k9}, (\{q_{33}\}, a)) = \psi_9(q_{33}, (\{q_{k9}\}, a))$ za $a \notin M_1$,

$\psi_{k9}(q_{k9}, (\{q_{34}\}, a)) = 0$ $a \in M_1 = \{195, 194, 203, 239, 207, 235, 198, 199\} \subset M$,
$\psi_{k9}(q_{k9}, (\{q_{34}\}, a)) = \psi_9(q_{34}, (\{q_{k9}\}, a)) = \psi_9(q_{34}, a)$ za $a \notin M_1$,

$\psi_{k9}(q_{k9}, (\{q_i\}, a)) = \psi_9(q_i, (\{q_{k9}\}, a)) = \psi_9(q_i, a)$ za $i \in \{37, 38, 43, 44\}$, $a \in A$,

$\psi_{k9}(q_{k9}, (\{q_{39}\}, a)) = 0$ $a \in M$,
$\psi_{k9}(q_{k9}, (\{q_{39}\}, a)) = \psi_9(q_{39}, (\{q_{k9}\}, a))$ za $a \notin M$,

$\psi_{k9}(q_{k9}, (\{q_{54}\}, a)) = 0$, $a \in A$,
$\varphi_9(q_{54}, (\{q_{k9}\}, a)) = q_{64}$ $\psi_9(q_{54}, (\{q_{k9}\}, a)) = e$ za $a \in M_1 = \{235, 239, 203, 207\}$,
$\varphi_9(q_{54}, (\{\lambda\}, a)) = q_{F_0}$ $\psi_9(q_{54}, (\{\lambda\}, a)) = 0$ za $a \in M_1$, tj. ako se automati A_9, K_9 ne susretnu,

$\psi_{k9}(q_{k9}, (\{q_{58}\}, a)) = 0$, $a \in A$,
$\varphi_9(q_{58}, (\{q_{k9}\}, a)) = q_{64}$ $\psi_9(q_{58}, (\{q_{k9}\}, a)) = e$ za $a \in M$
$\varphi_9(q_{58}, (\{\lambda\}, a)) = q_{F_0}$ $\psi_9(q_{58}, (\{\lambda\}, a)) = 0$ za $a \in M$, tj. ako se automati A_9, K_9 ne susretnu,

$\psi_{k9}(q_{k9}, (\{q_{60}\}, a)) = 0, \quad a \in A,$

$\varphi_9(q_{60}, (\{q_{k9}\}, a)) = q_{64} \quad \psi_9(q_{60}, (\{q_{k9}\}, a)) = e$ za $a \in M_1 = \{194, 195, 198, 199\},$

$\varphi_9(q_{60}, (\{\lambda\}, a)) = q_{F_0} \quad \psi_9(q_{60}, (\{\lambda\}, a) = 0$ za $a \in M_1,$ tj. ako se automati A_9, K_9 ne

susretnu,

$\psi_{k9}(q_{k9}, (\{q_{61}\}, a)) = 0, \quad a \in A,$

$\varphi_9(q_{61}, (\{q_{k9}\}, a)) = q_{64} \quad \psi_0(q_{61}, (\{q_{k9}\}, a)) = e$ za $a \in M \backslash \{227, 231\}$

$\varphi_9(q_{61}, (\{\lambda\}, a)) = q_{F_0} \quad \psi_9(q_{61}, (\{\lambda\}, a) = 0$ za $a \in M \backslash \{227, 231\},$ tj. ako se automati $A_9,$

K_9 ne susretnu,

$\psi_{k9}(q_{k9}, (\{q_{63}\}, a)) = 0, \quad a \in A,$

$\varphi_9(q_{63}, (\{q_{k9}\}, a)) = q_{25} \quad \psi_9(q_{63}, (\{q_{k9}\}, a)) = e$ za $a \in \{194, 195, 198, 199\} \subset M,$

$\varphi_9(q_{63}, (\{\lambda\}, a)) = q_{F_0} \quad \psi_9(q_{63}, (\{\lambda\}, a) = 0$ za $a \in \{194, 195, 198, 199\},$ tj. ako se

automati A_9, K_9 ne susretnu.

Zaključak

U radu su razmotrene mogućnosti automatnog prepoznavanja specijalnih klasa mozaičnih lavirinata, koje u geometrijskom smislu predstavljaju cifre. Treba primjetiti da je u radu data i teorijska osnova automatnog prepoznavanja ne samo cifara, već i ćiriličnih slova naše azbuke. U trećem poglavlju je definisana familija **Step**, čiji su elementi pravougli lavirinti, za koje znamo da ne postoji automat koji ih prepoznaje. Ova familija je definisana ne samo kao primjer familije čije je elemente nemoguće prepoznati automatom, već da bi kasnije mogli dokazati nepostojanje automata koji prepoznaje klasu mozaičnih lavirinata koja predstavlja cifru s "rupom". Na isti način se može dokazati nepostojanje automata koji prepoznaje klasu mozaičnih lavirinata koja bi predstavljala ćirilično slovo s "rupom" (familija **Step** obuhvata i ove pravougaone lavirinte, osim onog koji predstavlja ćirilično slovo V). Jednopovezana ćirilična slova se mogu definisati koristeći osnovne familije Φ_i, $1 \geq i \leq 9$, definisane u drugom poglavlju. Za ovako definisane klase mozaičnih lavirinata postoji automat koji ih prepoznaje. Zbog obimnosti, nijesu definisane i klase koje bi predstavljale ćirilična slova.

U radu su pokazane ograničene mogućnosti automata u prepoznavanju geometrijskih figura. Međutim, primjetimo da se programska realizacija kolektiva automata tipa (1, 1) ne usložnjava. Dovoljno je uvesti promjenljivu koja će pamtiti položaj automata kamena. Prema tome, praktična primjena automatnog prepoznavanja se ne umanjuje.

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Sadržaj