Exam

miercuri, 17 iunie 2020 14:52

Cojocaru Dan
Group 1

Honor pledge

I affirm that I will not give or receive any unauthorised help on this exam, and that all work will be my own.

1.

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(\([0-9][0-9][0-9]\))?[0-9][0-9][0-9]-[0-9][0-9][0-9]
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Explanation:

[0-9] any digit between 0 and 9

\(\) matching the parenthesis symbols

? zero or one times

2. a) $V_N = \{S_0, S_1, S_2\}$

$V_T = \{D, a, n\}$

$S = S_0$

$P:$ $S_0 \to D S_1 D$

$S_1 \to a S_2 a$

$S_2 \to n\,n$

b) $Q = \{q_0, q_1, q_2, q_3, q_4, q_5, q_6\}$ set of states

$\Sigma = \{D, a, n\}$ input symbols

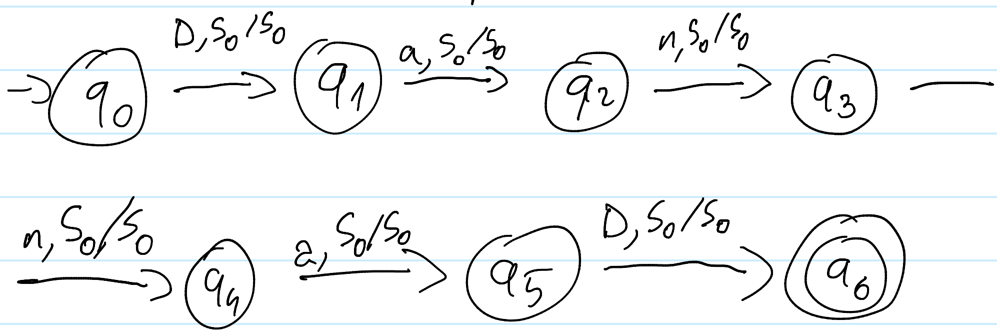
$\Gamma = \{S_0\}$ stack symbols

$q_0 = q_0$ starting state

$Z_0 = S_0$ starting top of stack

$F = \{q_6\}$ accepting states

δ : transition function



c) A PDA can be seen as an ε-NFA with a stack.

What a PDA adds to the formal

What a PDA adds to the formal definition is Γ and Z_0.

d) Accidentally did it at b)

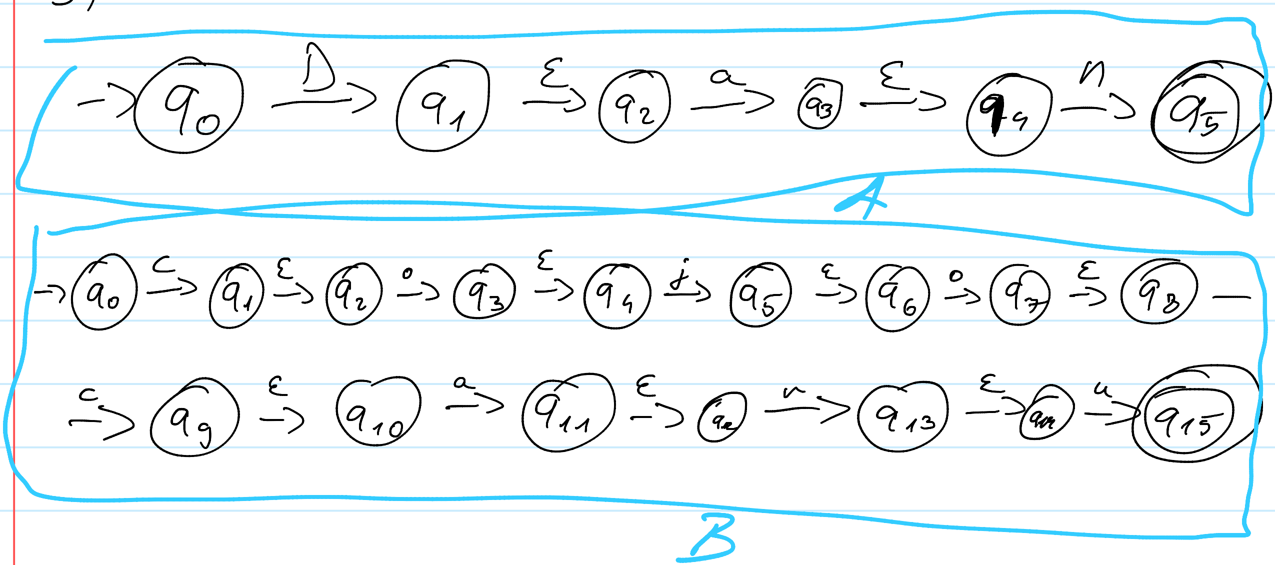
e)

3. $\Sigma = \{a, b, \dots, z\}$

$L = \{$ Dan or Cojocaru $\}$

a) RegEx for first : Dan
RegEx for last : Cojocaru

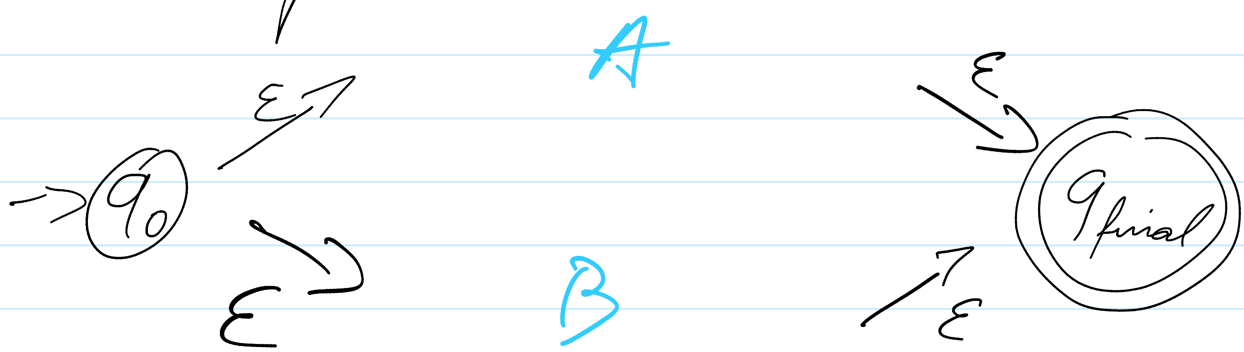
b)



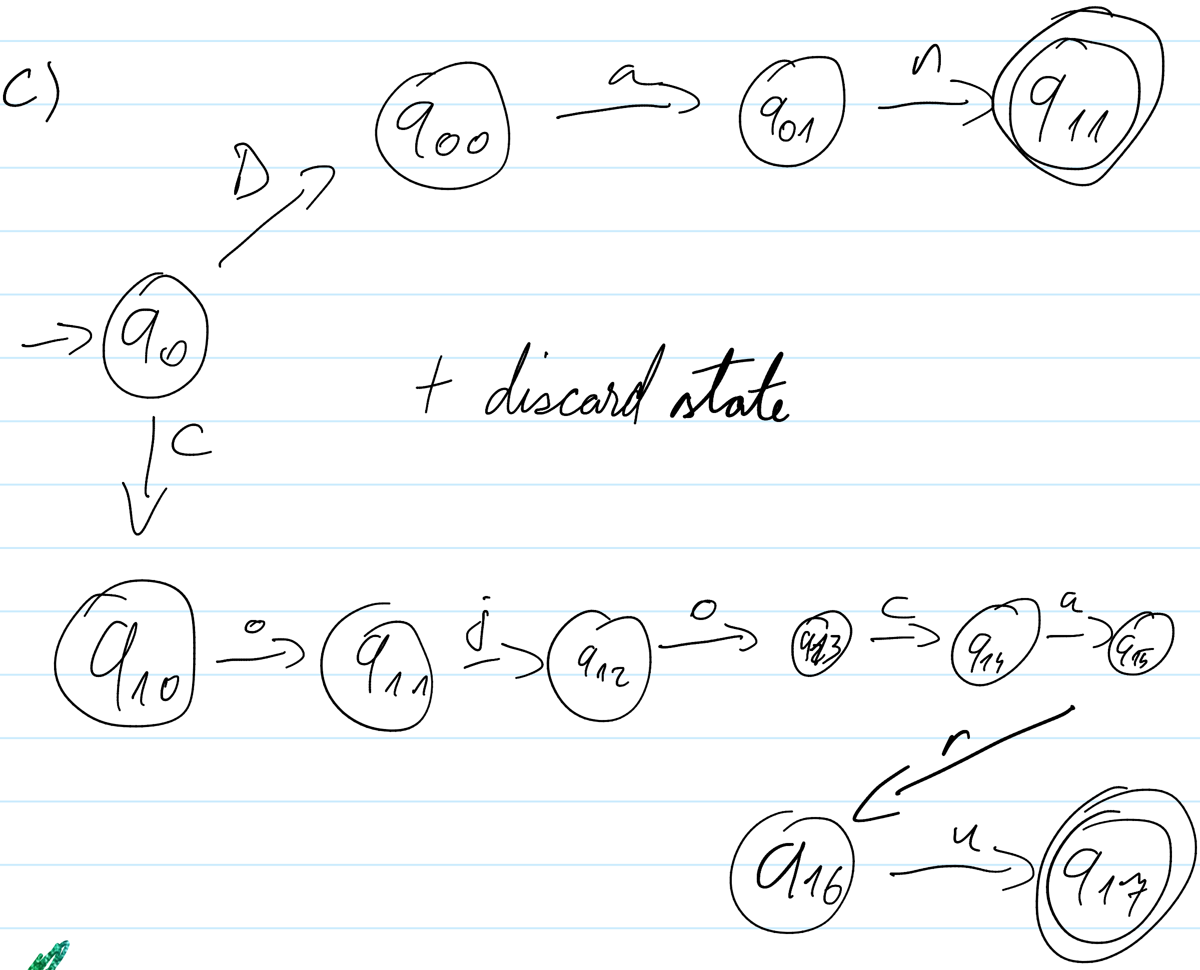
ε-NFA for L:

A

ε NFA for L:



c)



4. Table Filling Algorithm

1. Create a table for matching each state with each state and only use the part under the primary diagonal.

2. Mark each pair of states where one is accepting and one isn't as not equivalent.

3. For each pair of states, do the following:

- for each input symbol s, find the next state

(X_0, Y_0)

$X_0 \xrightarrow{s} X_1$

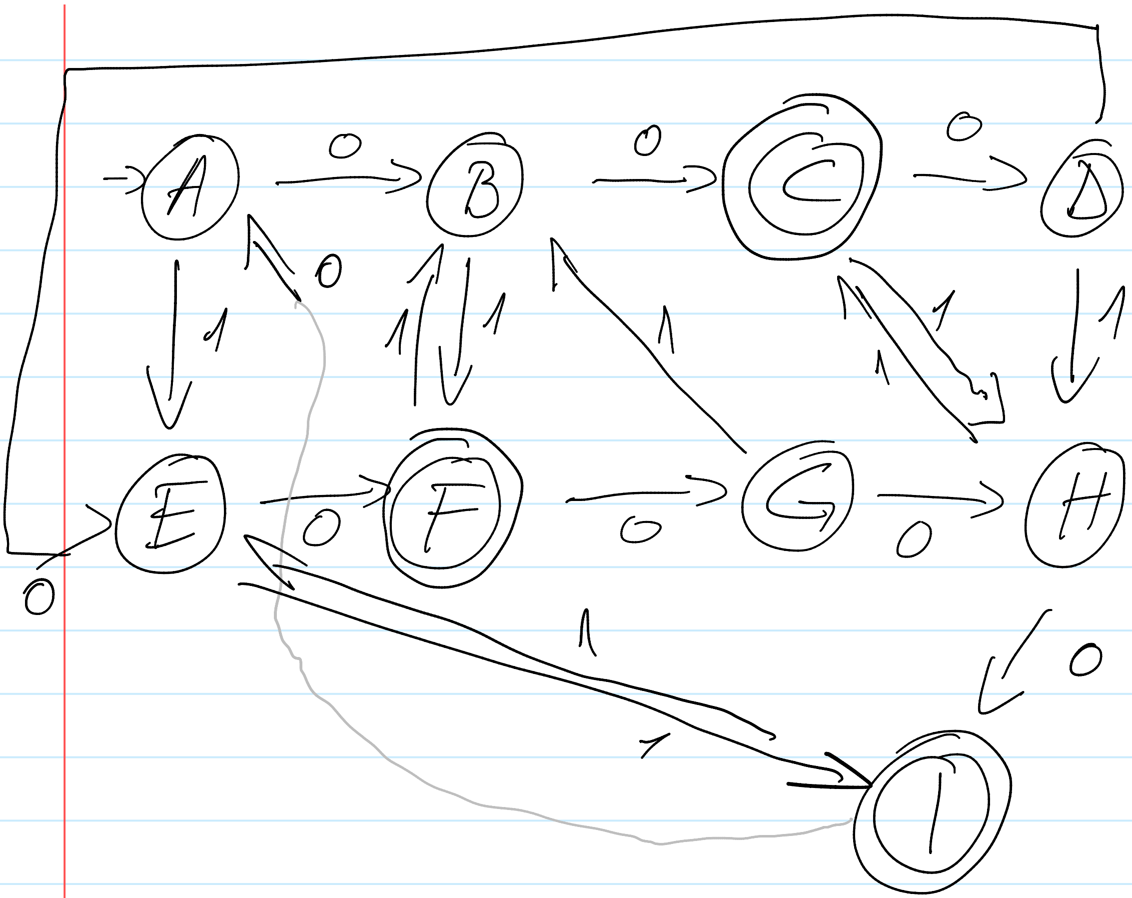
$Y_0 \xrightarrow{s} Y_1$

- if the pair (X_1, Y_1) is marked, mark the pair (X_0, Y_0) as well

4. Repeat 3. until no changes occur

c)

	0	1
→A	B	E
B	C	F
*C	D	H
D	E	H
E	F	I
*F	G	B
G	H	B
H	I	C
*I	A	E



	A	B	C	D	E	F	G	H	I
A									
B	X								
C	X	X							
D		X	X						
E	X		X	X					
F	X	X		X	X				
G		X	X		X	X			
H	X		X	X		X	X		
I	X	X		X	X		X	X	

Step 2: X between accepting and non accepting states

Step 3

$A \xrightarrow{0} B$ $\quad$ (C,B) X $\Rightarrow$ (B,A) X

$B \xrightarrow{0} C$

$A \xrightarrow{0} B$ $\quad$ (E,B) ...

$D \xrightarrow{0} E$

$A \xrightarrow{1} F$ $\quad$ (H,I)

$A \xrightarrow{1} E$ $\qquad$ $(H,E) \ldots$
$D \xrightarrow{1} H$

$B \xrightarrow{0} C$ $\qquad$ $(E,C) \times \Rightarrow (D,B) \times$
$D \xrightarrow{0} E$

$A \xrightarrow{0} B$ $\qquad$ $(F,B) \times \Rightarrow (E,A) \times$
$E \xrightarrow{0} F$

$B \xrightarrow{0} C$ $\qquad$ $(F,C) \ldots$
$E \xrightarrow{0} F$

$B \xrightarrow{1} F$ $\qquad$ $(I,F) \ldots$
$E \xrightarrow{1} I$

$D \xrightarrow{0} E$ $\qquad$ $(F,E) \times \Rightarrow (E,D) \times$
$E \xrightarrow{0} F$

$C \xrightarrow{0} D$ $\qquad$ $(G,D) \ldots$
$F \xrightarrow{0} G$

$C \xrightarrow{1} H$ $\qquad$ $(H,B) \ldots$
$F \xrightarrow{1} B$

$A \xrightarrow{0} B$ $\qquad$ $(H,B) \ldots$
$G \xrightarrow{0} H$

$A \xrightarrow{1} E$ $\qquad$ $(E,B) \ldots$
$G \xrightarrow{1} B$

$B \xrightarrow{0} C$ $\qquad$ $(H,C) \times \Rightarrow (G,B) \times$
[illegible]

$B \rightarrow C$ $\quad (H,C)\ X \Rightarrow (G,B)\ X$

$G \xrightarrow{0} H$

$D \xrightarrow{0} E$ $\quad (H,E) \ldots$

$G \xrightarrow{0} H$

$D \xrightarrow{1} H$ $\quad (H,B) \ldots$

$G \xrightarrow{1} B$

$E \xrightarrow{0} F$ $\quad (H,F)\ X \Rightarrow (G,E)\ X$

$G \xrightarrow{0} H$

$A \xrightarrow{0} B$ $\quad (I,B)\ X \Rightarrow (H,A)\ X$

$H \xrightarrow{0} I$

$B \xrightarrow{0} C$ $\quad (I,C) \ldots$

$H \xrightarrow{0} I$

$B \xrightarrow{1} F$ $\quad (F,C) \ldots$

$H \xrightarrow{1} C$

$D \xrightarrow{0} E$ $\quad (I,E)\ X \Rightarrow (H,D)\ X$

$H \xrightarrow{0} I$

$E \xrightarrow{1} I$ $\quad (I,C) \ldots$

$H \xrightarrow{1} C$

$G \xrightarrow{0} H$ $\quad (I,H)\ X \Rightarrow (H,G)\ X$

$H \xrightarrow{0} I$

$C \xrightarrow{0} D$ $\quad (D,A) \ldots$

$I \xrightarrow{0} A$

$C \xrightarrow{1} H \quad (H, E) \ldots$

$I \xrightarrow{1} E$

$F \xrightarrow{0} G \quad (G, A) \ldots$

$I \xrightarrow{0} A$

$F \xrightarrow{1} B \quad (E, B) \ldots$

$I \xrightarrow{1} E$

Conclusion

States A, D, G are equivalunt
States B, E, H are equivalent
States C, F, I are equivalent