Prova 02 - Linguagem Formais e Autômatos

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Questão 1-

$L = \{001, 10, 111\}$ e $M = \{\varepsilon, 001\}$

Logo:

$\rightarrow L \cup M = \{\varepsilon, 10, 001, 111\}$

$\rightarrow L\,M = \{001, 10, 111, 001001, 10001, 111001\}$

$\rightarrow L^2 = \{001001, 00110, 001111, 10001, 1010, 10111, 111001, 11110, 111111\}$ //

Questão 2-

Para repetição de 01 $\rightarrow (01)^*$

Para repetição de 10 $\rightarrow (10)^*$

Também é necessário para alternar entre 1 e 0 $\rightarrow 1(01)^*$ e $0(10)^*$

juntando todos esses chegamos a expressão desejada:

RE: $(01)^* + (10)^* + 0(10)^* + 1(01)^*$ //

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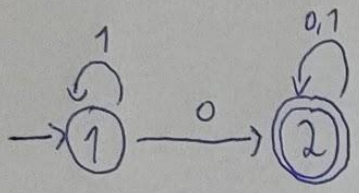
Questão 3 -



Para $K=0$ →

$R_{11}^{(0)}$	$\varepsilon + 1$
$R_{12}^{(0)}$	0
$R_{21}^{(0)}$	$\emptyset$
$R_{22}^{(0)}$	$(\varepsilon + 0 + 1)$

- Para $K=1; i=1; j=1$:

$$R_{11}^{(1)} = R_{11}^{(0)} + R_{11}^{(0)} (R_{11}^{(0)})^* R_{11}^{(0)} \Rightarrow (\varepsilon+1) + (\varepsilon+1)((\varepsilon+1))^*(\varepsilon+1) \Rightarrow$$

$$\Rightarrow (\varepsilon+1) + (\varepsilon+1)(\varepsilon+1)^+ \Rightarrow (\varepsilon+1)(\varepsilon+(\varepsilon+1)^+) \Rightarrow (\varepsilon+1)(\varepsilon+1)^* \Rightarrow$$

$$\Rightarrow (\varepsilon+1)^+ \Rightarrow 1^* \rightarrow \{\varepsilon, 1, 11, 111, \dots\} = 1^*$$

- Para $K=1; j=2; i=1$

$$R_{12}^{1} = R_{12}^{0} + R_{11}^{0} (R_{11}^{0})^* R_{12}^{0} \Rightarrow 0 + (\varepsilon+1)(\varepsilon+1)^* 0 = (0 + (\varepsilon+1)^+ 0) \Rightarrow$$

$$\Rightarrow (\varepsilon + 1^*)0 = 1^* 0$$

- Para $K=1; i=2; j=1$

$$R_{21}^{1} = R_{21}^{0} + R_{21}^{0} (R_{11}^{0})^* R_{11}^{0} \Rightarrow \emptyset + \emptyset(\varepsilon+1)^*(\varepsilon+1)^* \emptyset = \emptyset$$

- Para $K=1; i=2; j=2$

$$R_{22}^{1} = R_{22}^{0} + R_{21}^{0} (R_{11}^{0})^* R_{12}^{0} \Rightarrow (\varepsilon+0+1) + \emptyset(\varepsilon+1)^* 0 \Rightarrow (\varepsilon+0+1)$$

R_{11}^{1}	1^*
R_{12}^{1}	1^*0
R_{21}^{1}	$\emptyset$
R_{22}^{1}	$\varepsilon+0+1$

Continua →

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Questão 3 - continuação

- Para $K=2; i=1; j=1$

$$R_{11}^2 = R_{11}^1 + R_{12}^1 (R_{22}^1)^* R_{21}^1 \Rightarrow 1^* + 1^* 0 (\varepsilon + 0 + 1)^* \emptyset = 1^*$$

- Para $K=2; i=1; j=2$

$$R_{12}^2 = R_{12}^1 + R_{12}^1 (R_{22}^1)^* R_{22}^1 \Rightarrow 1^*0 + 1^*0(\varepsilon + 0 + 1)^* (\varepsilon + 0 + 1) \Rightarrow$$

$$\Rightarrow 1^*0 + 1^*0(\varepsilon + 0 + 1)^+ \Rightarrow 1^*0(\varepsilon + (\varepsilon + 0 + 1)^+) \Rightarrow 1^*0(0+1)^*$$

- Para $K=2; i=2; j=1$

$$R_{21}^2 = R_{21}^1 + R_{22}^1 (R_{22}^1)^* R_{21}^1 \Rightarrow \emptyset + (\varepsilon + 0 + 1)(\varepsilon + 0 + 1)^* \emptyset \Rightarrow \emptyset$$

- Para $K=2; i=2; j=2$

$$R_{22}^2 = R_{22}^1 + R_{22}^1 (R_{22}^1)^* R_{22}^1 \Rightarrow (\varepsilon + 0 + 1) + (\varepsilon + 0 + 1)(\varepsilon + 0 + 1)^* (\varepsilon + 0 + 1) \Rightarrow$$

$$\Rightarrow (\varepsilon + 0 + 1) + (\varepsilon + 0 + 1)(\varepsilon + 0 + 1)^+ \Rightarrow (\varepsilon + 0 + 1)(\varepsilon + (\varepsilon + 0 + 1)^+) \Rightarrow$$

$$\Rightarrow (\varepsilon + 0 + 1)(\varepsilon + 0 + 1)^* \Rightarrow (\varepsilon + 0 + 1)^+ \Rightarrow (0+1)^*$$

R_{11}^2	1^*
R_{12}^2	$1^*0(0+1)^*$
R_{21}^2	$\emptyset$
R_{22}^2	$(0+1)^*$

$1^*0(0+1)^*$

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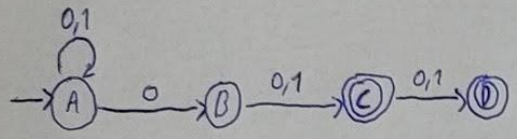
Questão 4 -

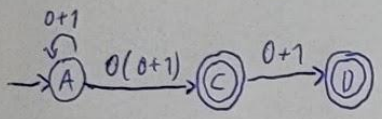


Eliminação de estados:

- Eliminação do estado B:

$Q = 0$; $S = \emptyset$; $P = 0+1$; $R = \emptyset$

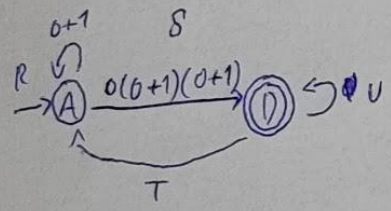
$R + Q S^* P = \emptyset + 0\emptyset^*(0+1) \Rightarrow \emptyset + 0(0+1) \Rightarrow 0(0+1)$



- Eliminação do estado C:

$Q = 0(0+1)$; $S = \emptyset$; $P = 0+1$; $R = \emptyset$

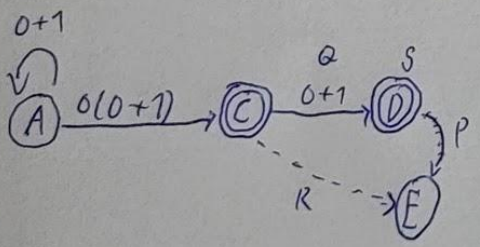
$R + Q S^* P = \emptyset + (0(0+1))\emptyset^*(0+1) \Rightarrow 0(0+1)(0+1)$



$R = 0+1$; $S = 0(0+1)(0+1)$; $U = \emptyset$; $T = \emptyset$

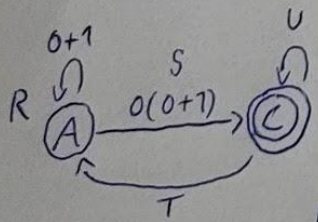
$(R + SU^*T)^* SU^* = ((0+1) + (0(0+1)(0+1))\emptyset^*\emptyset)^*(0(0+1)(0+1)\emptyset^*)$

$\Rightarrow ((0+1)+\emptyset)^*(0(0+1)(0+1)) \Rightarrow (0+1)^*(0(0+1)(0+1)) = E_1$



$R = \emptyset$; $S = \emptyset$; $P = \emptyset$; $Q = 0+1$

$R + Q S^* P = \emptyset + (0+1)\emptyset^*\emptyset \Rightarrow \emptyset$



$R = 0+1$; $S = 0(0+1)$; $U = \emptyset$; $T = \emptyset$

$(R + SU^* + T)^* SU^* = (0+1) + (0(0+1))\emptyset^*\emptyset)^* 0(0+1)\emptyset^* \Rightarrow (0+1)^* 0(0+1) = E_2$

$E_T = E_1 + E_2 = (0+1)^*(0(0+1)(0+1)) + (0+1)^* 0(0+1)$ //

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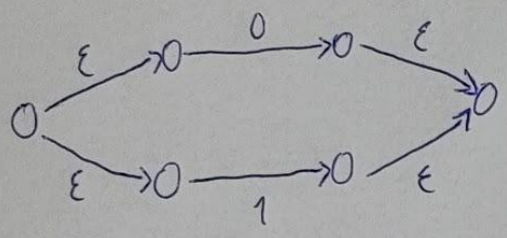
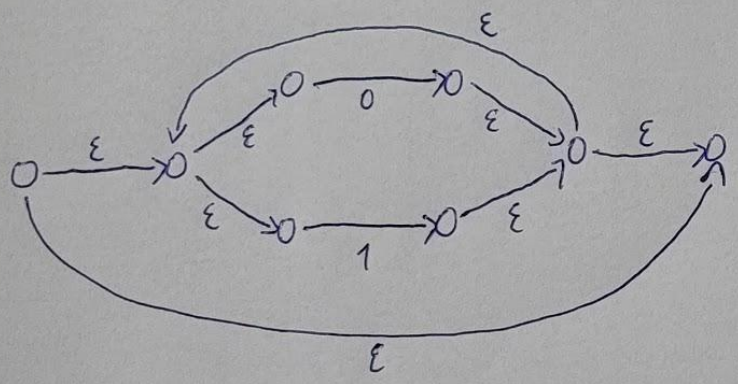
Questão 5 -

$(0+1)^*1(0+1)$

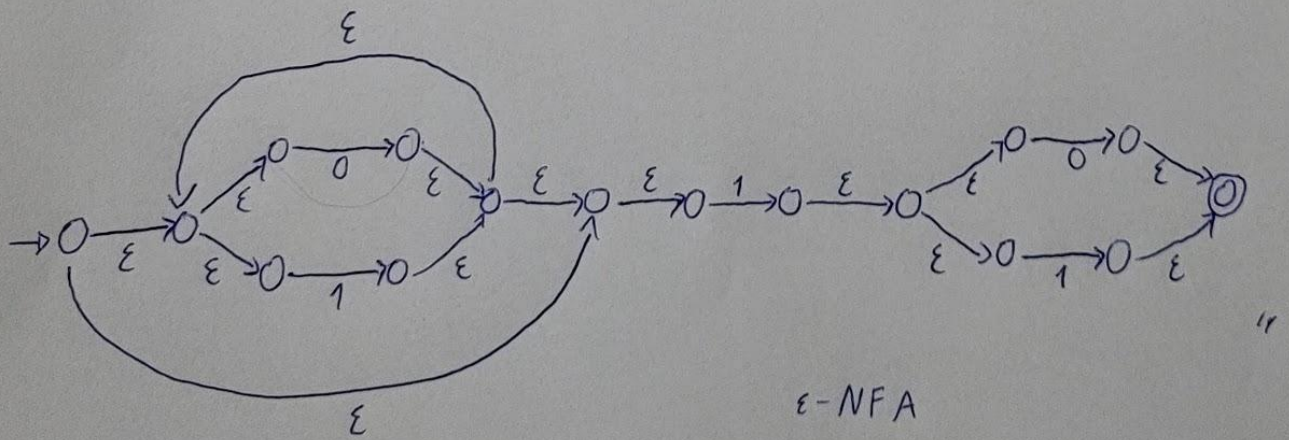
- Autômato para $0+1$:



- Autômato para $(0+1)^*$:



- Autômato completo



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