




1COP020 - Lista de Exercícios 01

1.  **Exercício Teórico:** Determine os seguintes fechos de Kleene:

- (a) $\{ab, c\}^* = \{\lambda, ab, c, ab, abab, cc, cab, \dots\}$
 (b) $\{a, b, c\}^+ = \{a, b, c, ab, ac, ba, bc, ca, cb, abc, \dots\}$
 (c) $\{abc\}^* = \{\lambda, abc, abcabc, abcabcabc, \dots\}$

2.  **Exercício Teórico:** Determine o resultado das seguintes operações nas linguagens indicadas:


- (a) $\{a, b\} \cup \{c, d\} = \{a, b, c, d\}$
 (b) $\{100, 010, 110\} \cup \{00, 01, 11\} = \{100, 010, 110, 00, 01, 11\}$
 (c) $\{101, 110\} \cdot \{00, 11\} = \{10100, 10111, 11000, 11011\}$
 (d) $\{Anab, Emanu, Gabri, Isab, Rafa\} \cdot \{ela\} = \{Emabela, Emanuela, Gabriela, Isabel, Rafaela\}$

3.  **Exercício Teórico:** Considere o seguinte alfabeto:

$$\Sigma = \{\uparrow, \downarrow, \curvearrowright\}$$

determine:

- (a) $\Sigma^2 = \{\uparrow\uparrow, \uparrow\downarrow, \uparrow\curvearrowright, \downarrow\uparrow, \downarrow\downarrow, \downarrow\curvearrowright, \curvearrowright\uparrow, \curvearrowright\downarrow, \curvearrowright\curvearrowright\}$
 (b) $\Sigma^3 =$
 (c) $\Sigma^2 \cup \Sigma^2 = \{\uparrow\uparrow, \uparrow\downarrow, \uparrow\curvearrowright, \downarrow\uparrow, \downarrow\downarrow, \downarrow\curvearrowright, \curvearrowright\uparrow, \curvearrowright\downarrow, \curvearrowright\curvearrowright\}$
 (d) $\Sigma^2 \cdot \Sigma^2 =$

4.  **Exercício Teórico:** Considere os seguintes alfabetos:

$$\Sigma_1 = \{H_2, Fe\}$$

$$\Sigma_2 = \{SO_4, O_2, Cl_2\}$$

determine:

- (a) $\Sigma_1^2 = \{H_2H_2, H_2Fe, FeH_2, FeFe\}$
 (b) $\Sigma_1^2 \cup \Sigma_2^2 = \{H_2H_2, H_2Fe, FeH_2, FeFe, SO_4SO_4, SO_4O_2, SO_4Cl_2, O_2SO_4, O_2O_2, O_2Cl_2, Cl_2SO_4, Cl_2O_2, Cl_2Cl_2\}$
 (c) $\Sigma_1^1 \cdot \Sigma_2^1 = \{H_2SO_4, H_2O_2, H_2Cl_2, FeSO_4, FeO_2, FeCl_2\}$

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LISTA_1_EXERCICIO_1_LETRA_d : $\Sigma = \{!, d, \text{!}!\}$

[illegible]


Handwritten musical notation on a single staff, consisting of a series of eighth and sixteenth notes.

LISTA-1-EXERCICIO-1-LETRA-d:


$\Sigma^2 \cdot \Sigma^2 =$

Rafael Polho Tabarin

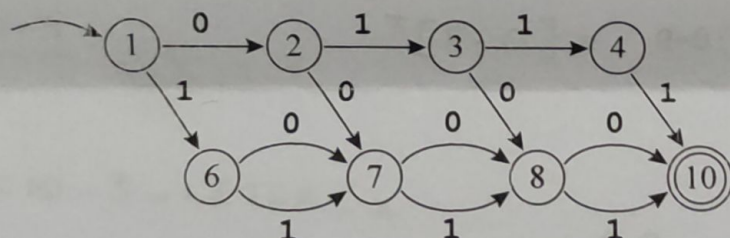
1COP020 - Lista de Exercícios 02

1.  **Exercício Teórico:** Escreva expressões regulares para cada uma das descrições a seguir.

- (a) Cadeias pertencentes ao alfabeto $\{a, b, c\}$ onde o primeiro a precede o primeiro b . $(a|c)^* a (a|b|c)^* b (a|b|c)^*$
- (b) Cadeias pertencentes ao alfabeto $\{a, b, c\}$ com um número par de a 's. $(b|c)(aa)^* a (b|c)^* (aa)^* a (b|c)^*$
- (c) Números binários múltiplos de 4. $(0|1)^* 00$
- (d) Números binários maiores do que 101001. $(1^* 0 1^* 0 1^*)^+$

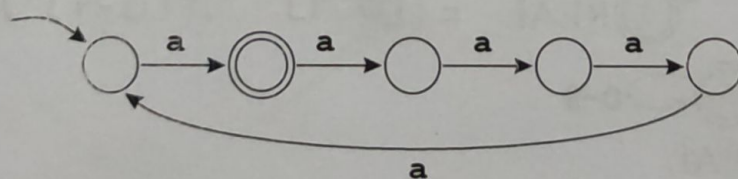
2.  **Exercício Teórico:** Explique em português informal o que cada um dos autômatos a seguir reconhece.

(a)




= Reconhece os números binários de 0 a 8.

(b)



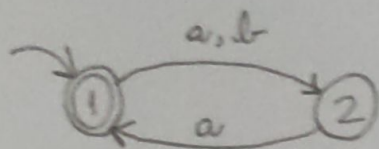
= Reconhece strings onde a sequência se inicia com 1 "a" e é seguido por múltiplos de 5 "a"s.

3.  **Exercício Teórico:** Converta as expressões regulares a seguir em autômatos finitos:

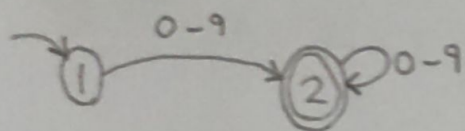
- (a) $((a|b)a)^*$
- (b) $[0-9]^+$
- (c) $[a-z][a-z0-9]^*$
- (d) $([1-9]^+ "." [0-9]^*) | ([0-9]^+ "." [0-9]^+)$
- (e) $(1(0|1)^*(11|10|01)) | (11|10|1)$

Rafael Palhet Zekavin

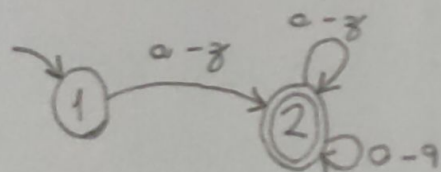
LISTA_2_EXERCICIO_3_LETRA_a: $((c|b)ac)^*$



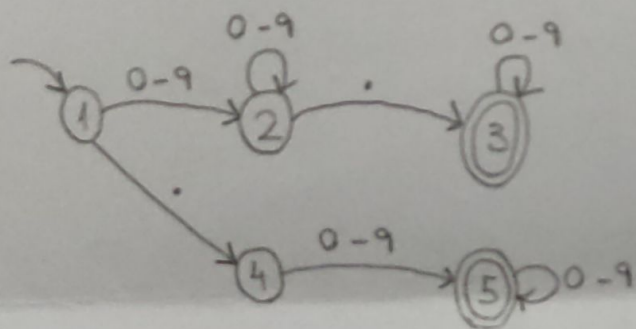
LISTA_2_EXERCICIO_3_LETRA_b: $[0-9]^+$



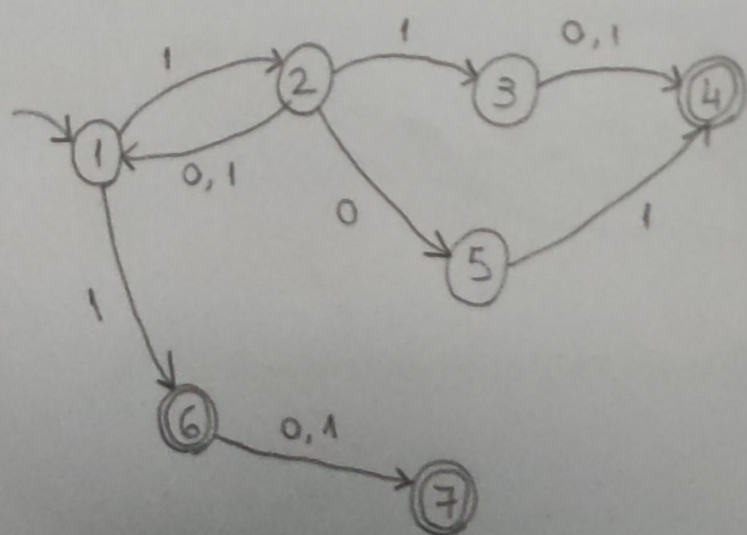
LISTA_2_EXERCICIO_3_LETRA_c: $[a-z][a-z0-9]^*$




LISTA_2_EXERCICIO_3_LETRA_d: $([0-9]^+ "[0-9]^*") | ([0-9]^* "[0-9]^+)$



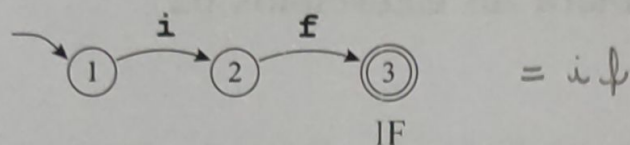
LISTA_2_EXERCICIO_3_LETRA_e:



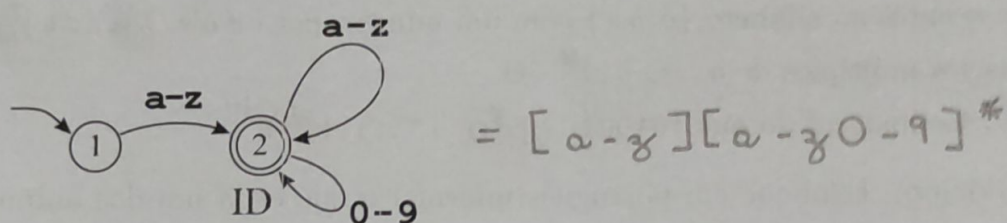
Rafael Polheite Teixeira

4.  **Exercício Teórico:** Para cada autômato a seguir, escreva a expressão regular da linguagem aceita pelo mesmo.

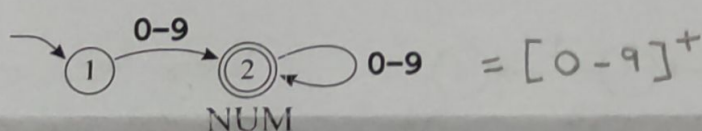
(a)



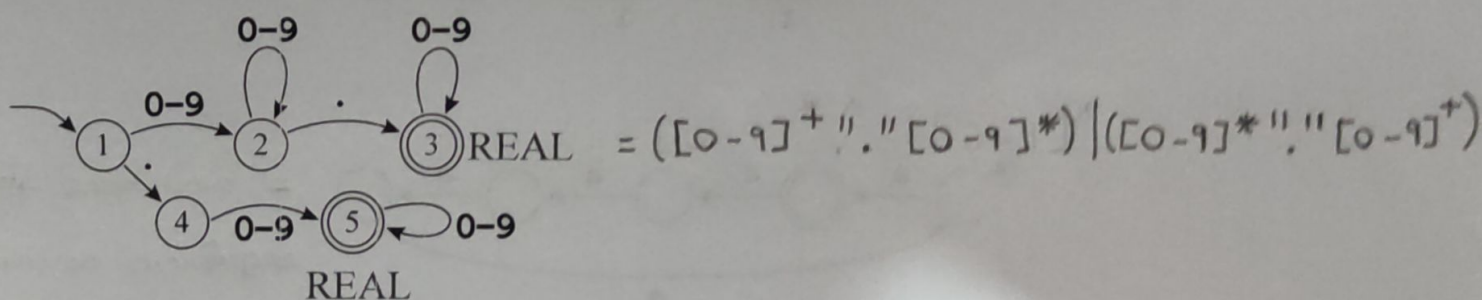
(b)



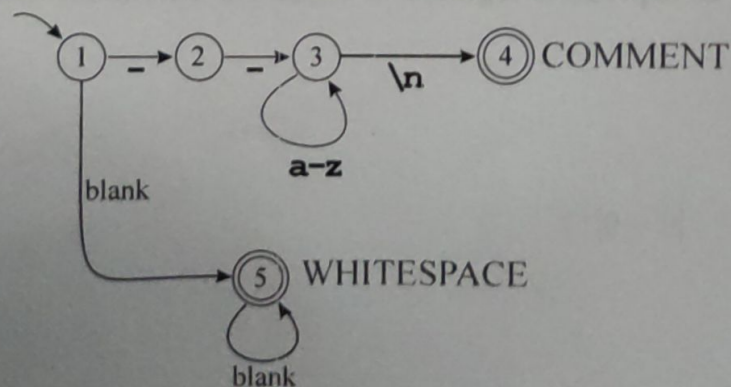
(c)



(d)

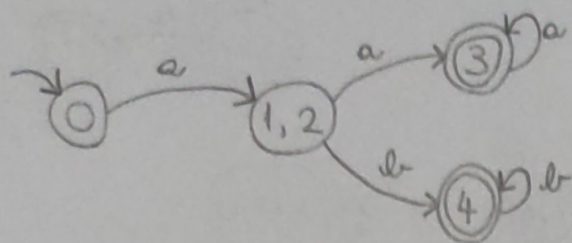


(e)

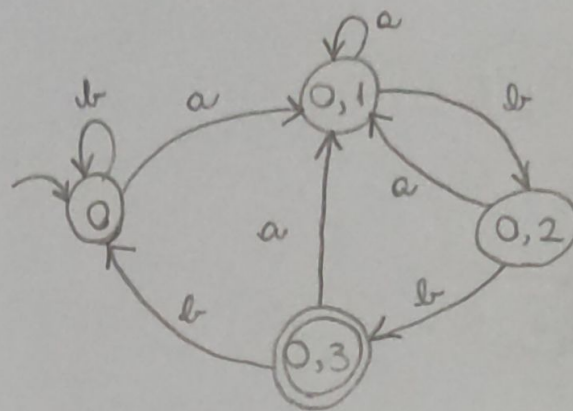


$$= ("--"[a-z]^* "\n") \mid (" " ^+)$$

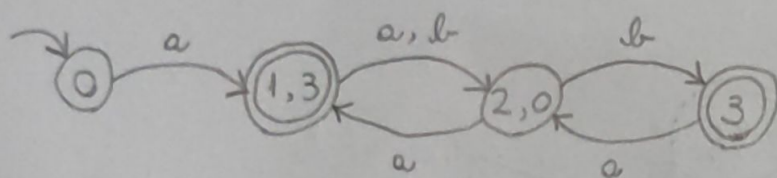
LISTA_3_EXERCICIO_1_LETRA_a:



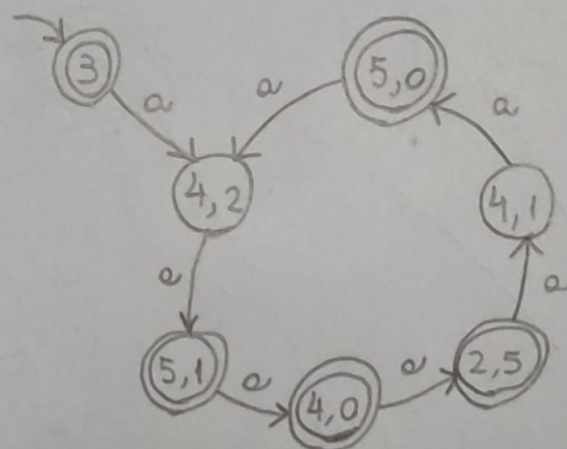
LISTA_3_EXERCICIO_1_LETRA_b:



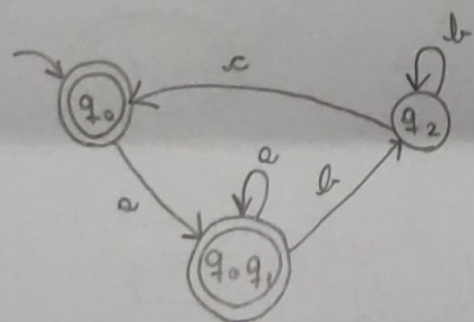
LISTA_3_EXERCICIO_1_LETRA_c:



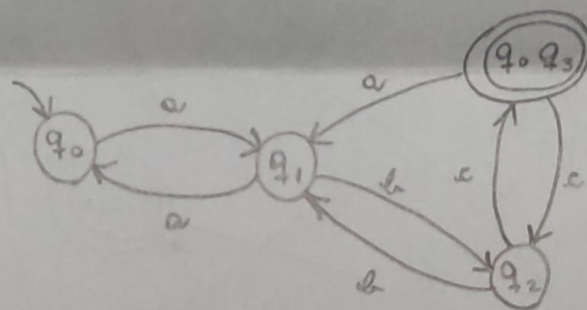
LISTA_3_EXERCICIO_1_LETRA_d:



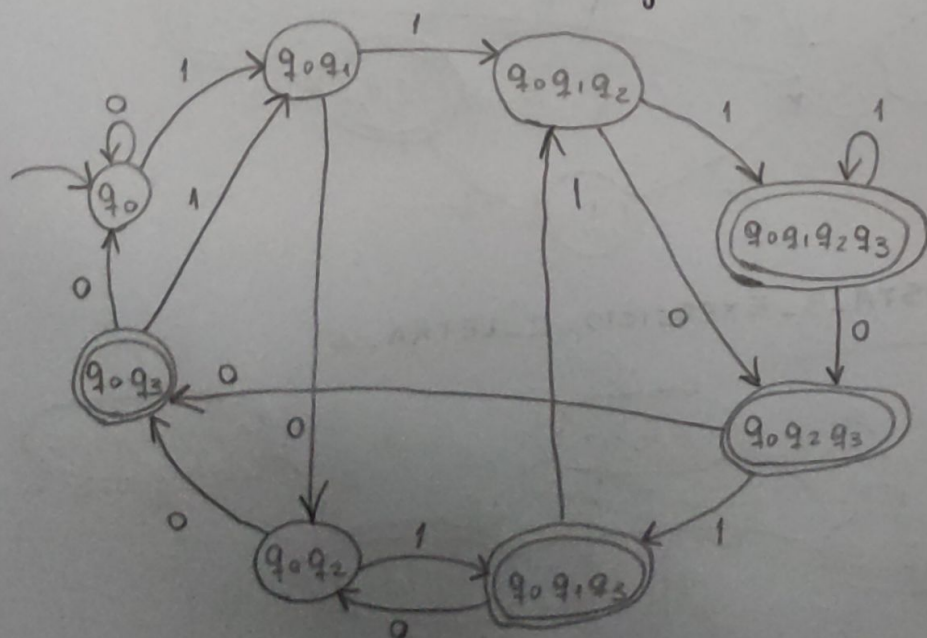
LISTA_3_EXERCICIO_1_LETRA_e:



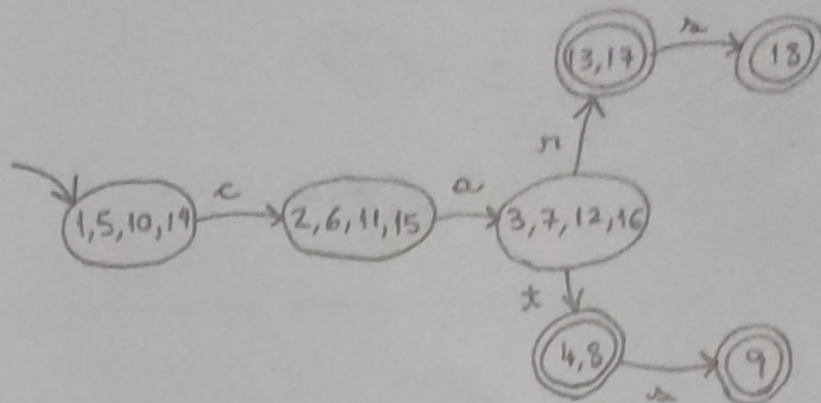
LISTA_3_EXERCICIO_1_LETRA_f:



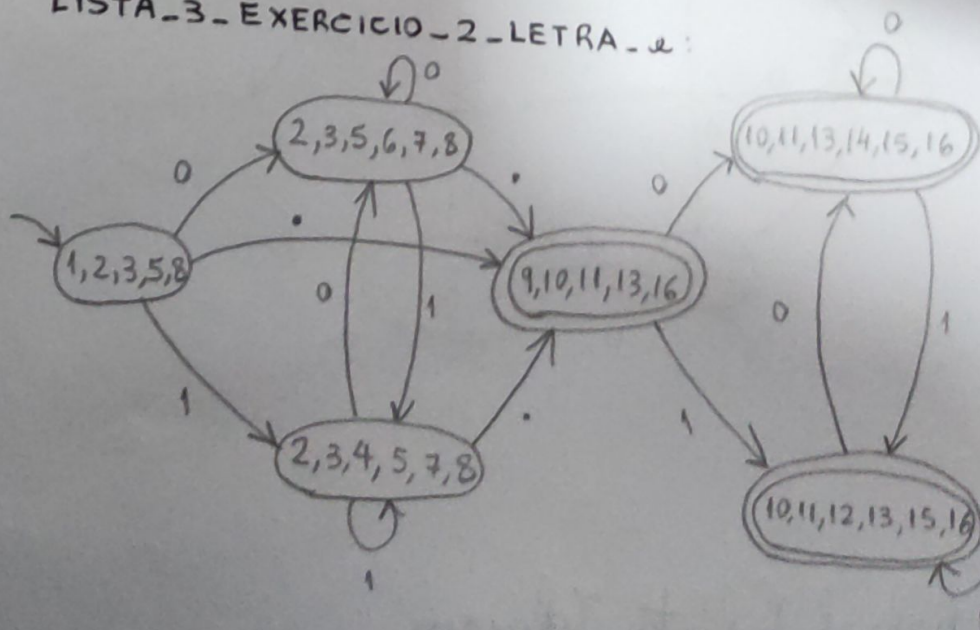
LISTA_3_EXERCICIO_1_LETRA_g:



LISTA-3-EXERCICIO-2-LETRA-c:

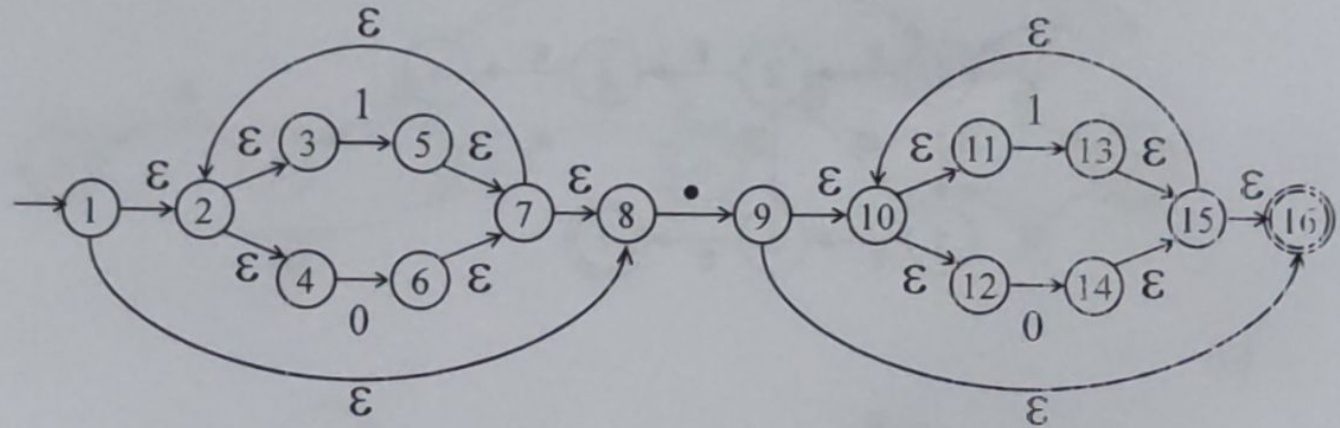


LISTA_3_EXERCICIO_2_LETRA_e

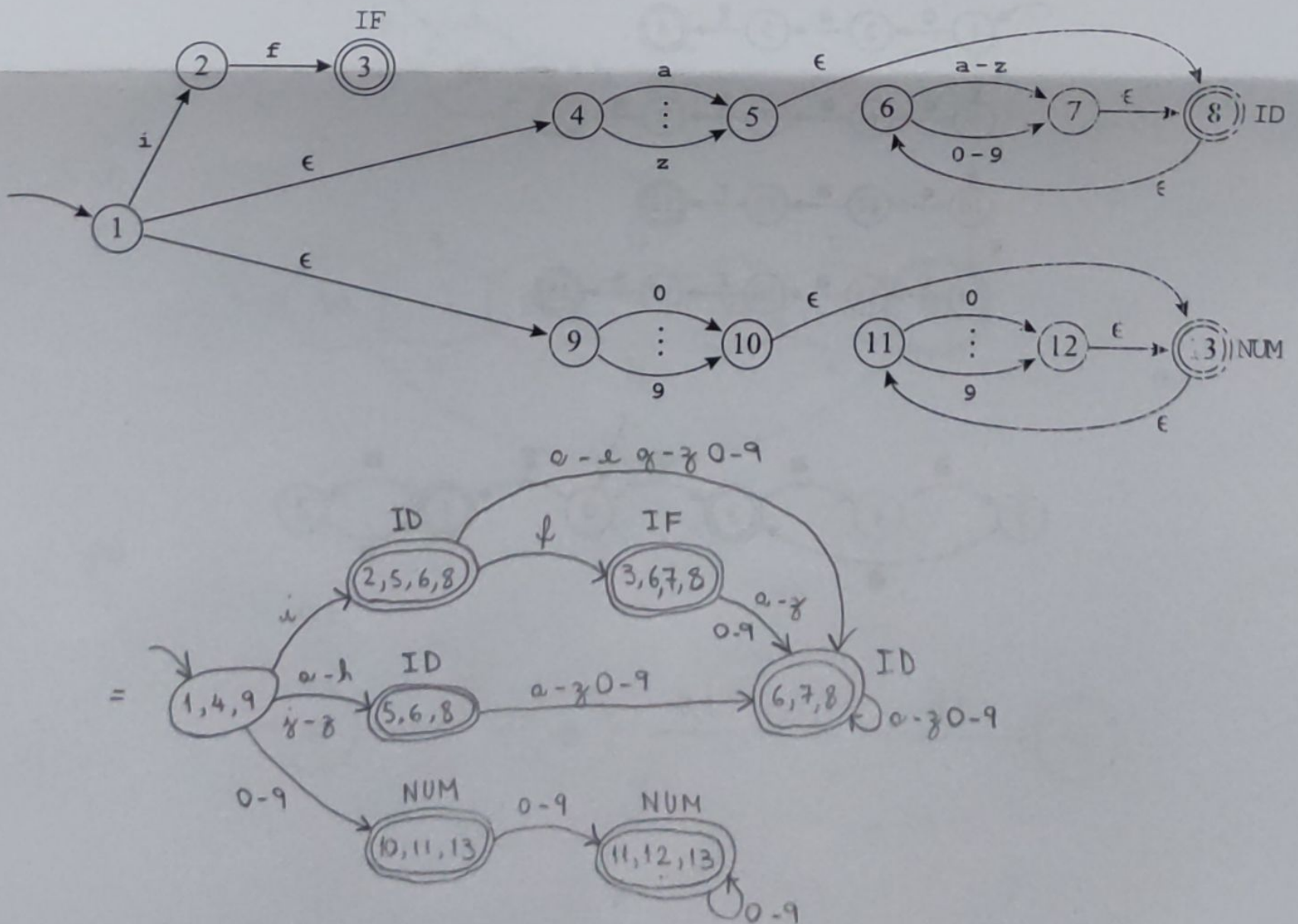


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(e)



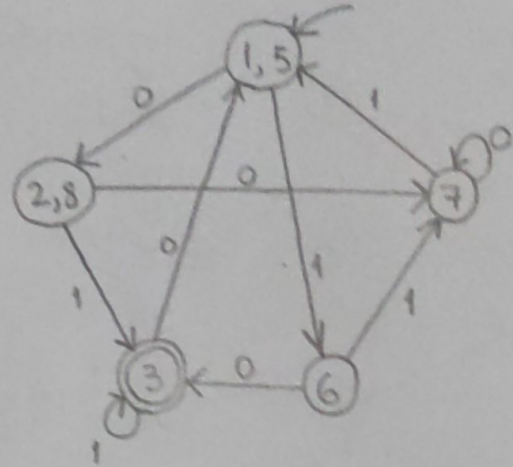
3. **Exercício Teórico:** Converta para AFD o AFND- ϵ a seguir. Neste autômato, os *tokens* reconhecidos seguem a seguinte ordem de prioridade: IF, NUM, ID.



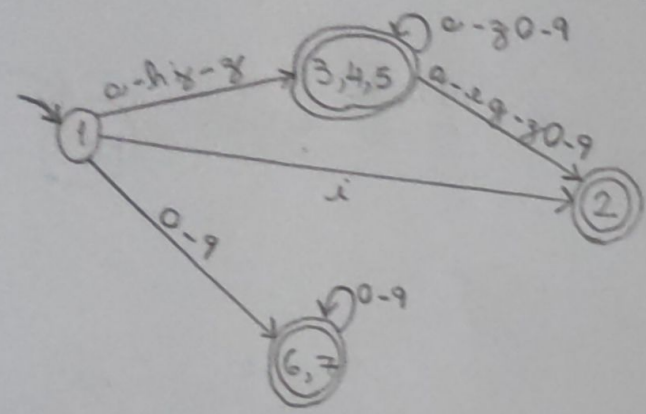
LISTA_4_EXERCICIO_1_LETRA_b:



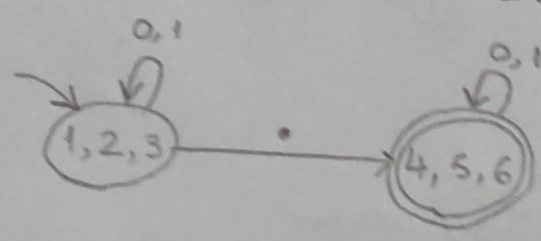
LISTA_4_EXERCICIO_1_LETRA_c:



LISTA_4_EXERCICIO_1_LETRA_a:



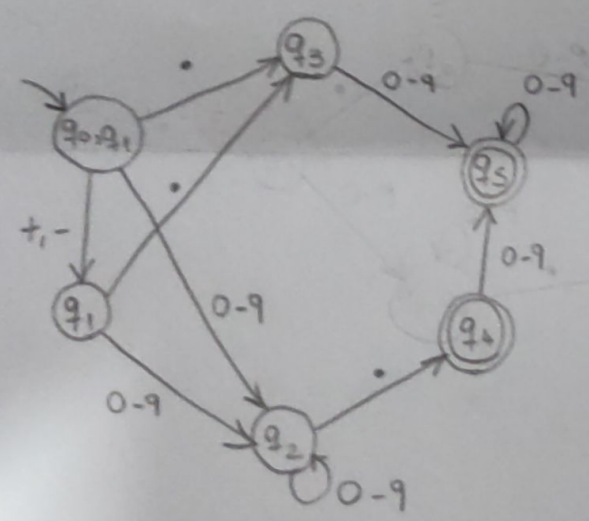
LISTA_4_EXERCICIO_2_LETRA_a:



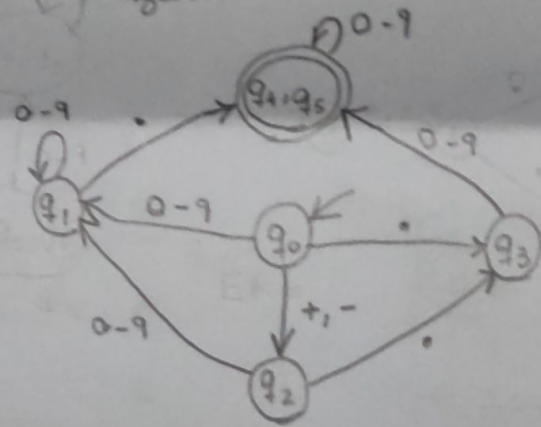
$$ER = (0|1)^* "." (0|1)^*$$

LISTA_4_EXERCICIO_2_LETRA_b:

NFA-E → DFA:



Minimizar:

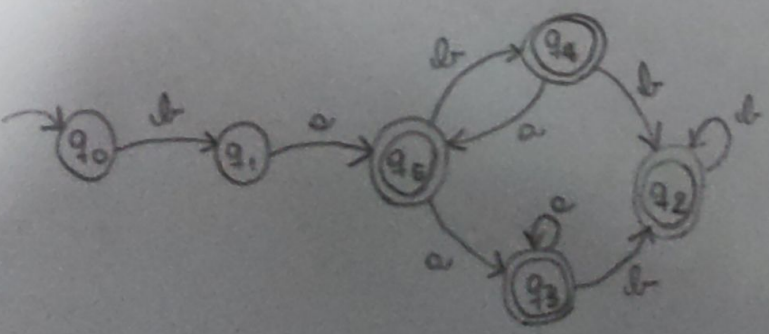


$$ER = ([0-9]^+ "." [0-9]^*) | ("." [0-9]^+)$$

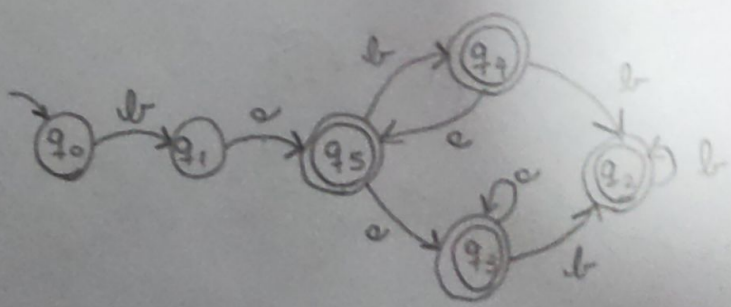
$$([+, -]([0-9]^+ "." [0-9]^*) | ("." [0-9]^+))$$

LISTA_4_EXERCICIO_3

autA:



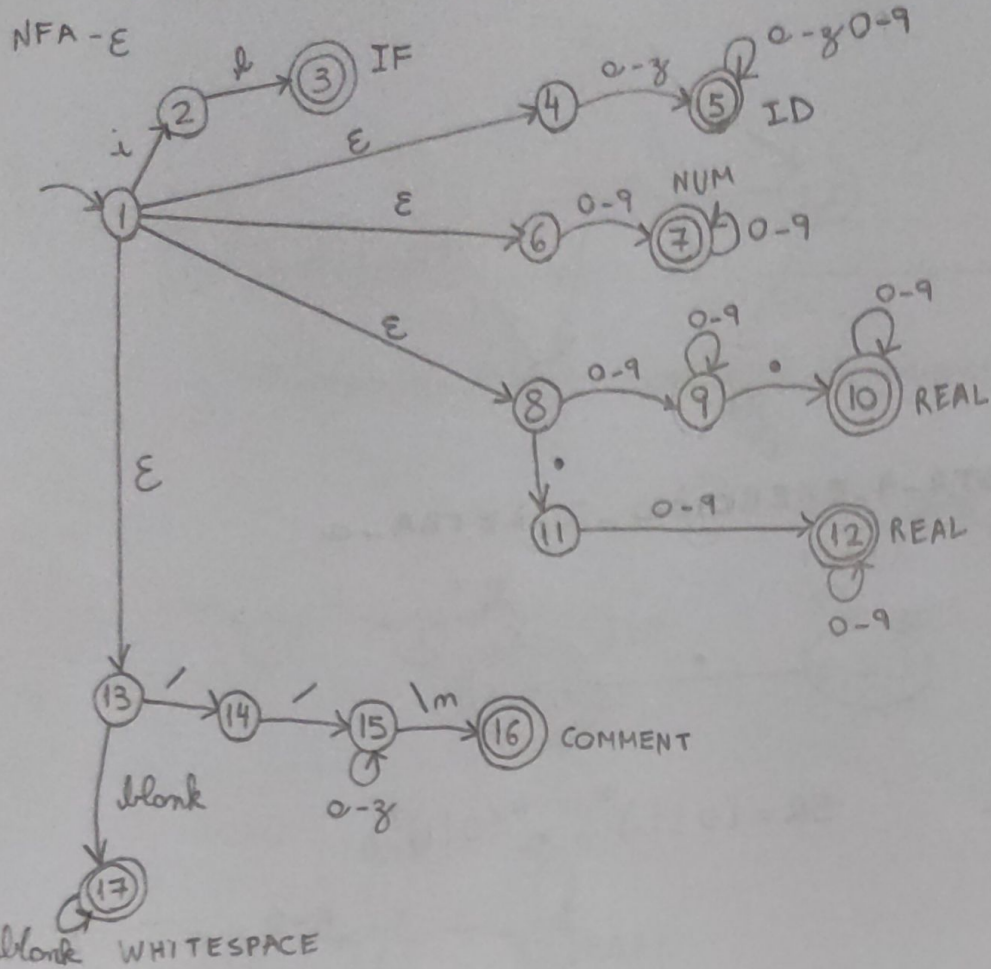
autB:



⇒ Equivalentes : $ER = b a ((a^+ b^+) | ((b a)^* b^+))^*$

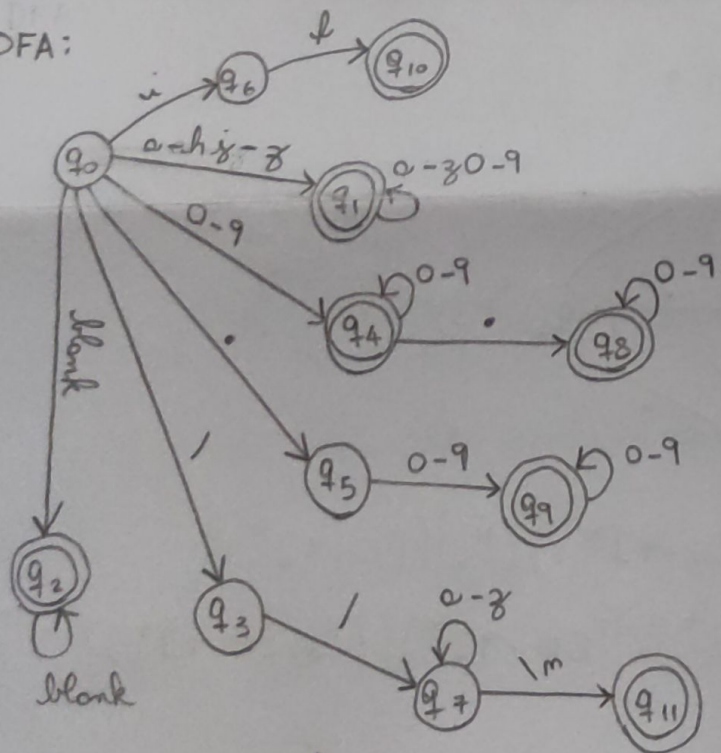
Rafael Pollete Tkavarin

LISTA_4_EXERCICIO_4_LETRA_a

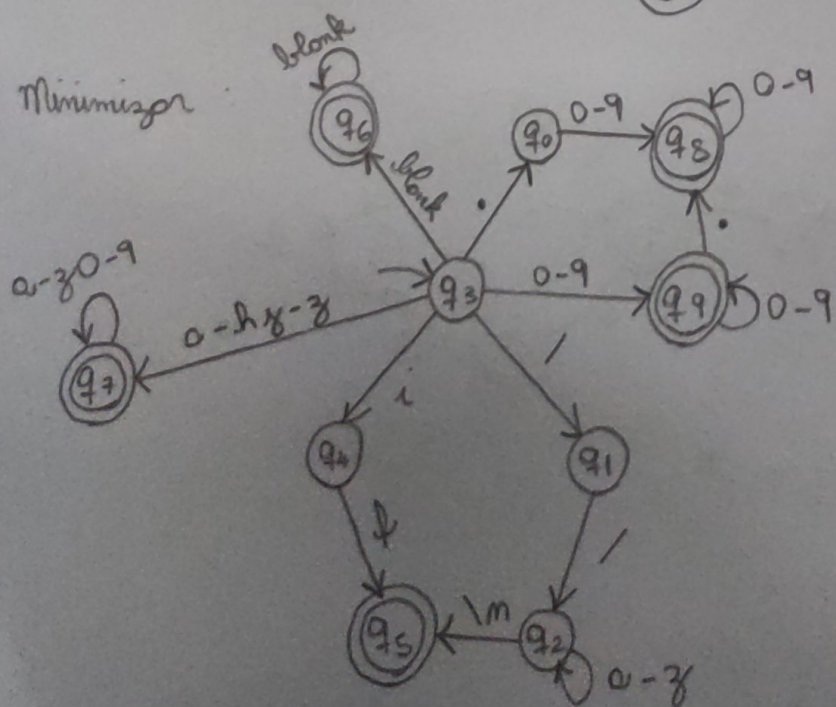


LISTA_4_EXERCICIO_4_LETRA_b

DFA:

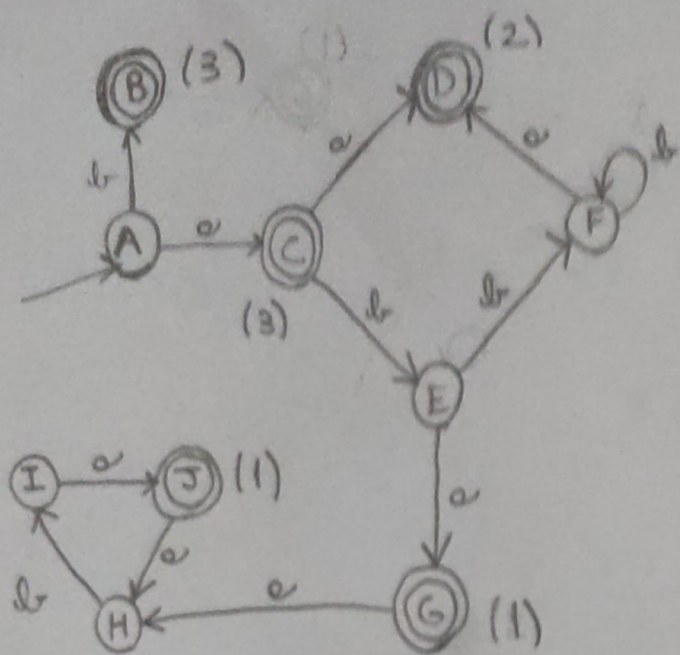


Minimizador



Rafael Polleta Tabarun

LISTA_5_EXERCICIO_3



Last Symbol	Current State	Current Input	Next Action
O	A	a a b b b a	-
C	C	a a b b b a	-
C	E	a a b b b a	-
G	G	a a b b b a	-
G	H	a a b b b a	-
G	I	a a b b b a	-
G	O	a a b b b a	(action 1)
O	A	a a b b b a	-
C	C	a a b b b a	-
C	E	a a b b b a	-
C	F	a a b b b a	-
D	D	a a b b b a	-
D	O	a a b b b a	(action 2)
O	A	a a b b b a	-
B	B	a a b b b a	-
B	O	a a b b b a	(action 3)
O	A	a a b b b a	-
C	C	a a b b b a	(action 3)

Rafael Roberto Lacerda