

Laboratorio 2

Para este laboratorio cree un repositorio de github, dónde cada branch sea la solución a los siguientes ejercicios.

- Grabe un video de no más de 10 minutos donde muestre la ejecución de sus programas para los ejercicios 2 y 3. Súbalos a YouTube como video no listado y adjúntelo en el README. de su repositorio.

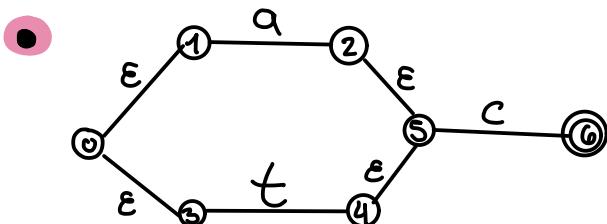
Problema 1: 25%

Convierta las siguientes expresiones regulares en autómatas finitos deterministas(AFD). Muestre todo el procedimiento.

- Conversión de expresión regular a AFN
- Tablas de transición
- Conversión AFN a AFD

- $(a \mid t)c$
- $(a \mid b)^*$
- $(a^* \mid b^*)^*$
- $((\epsilon \mid a) \mid b^*)^*$
- $(a \mid b)^* abb(a \mid b)^*$
- $0? (1?)? 0^*$
- $\text{if} \backslash([ae]^+ \backslash) \backslash([ei]^+ \backslash) (\backslash n(\text{else} \backslash([jl]^+)))?$
- $[ae03]^+ @ [ae03]^+ . (\text{com} \mid \text{net} \mid \text{org}) . (\text{gt} \mid \text{cr} \mid \text{co})?$

a. $(a \mid t)c$



	a	t	c	ϵ^*
0	—	—	—	{0,1,3}
1	2	—	—	1
2	—	—	—	{2,5}
3	—	4	—	3
4	—	—	—	{4,5}
5	—	—	6	5
6	—	—	—	6

• estados AFN $a\epsilon^*$ $t\epsilon^*$ $c\epsilon^*$

$A = \{0,1,3\}$ $B = \{2,5\}$ $C = \{4,5\}$

$B = \{2,5\}$ — —

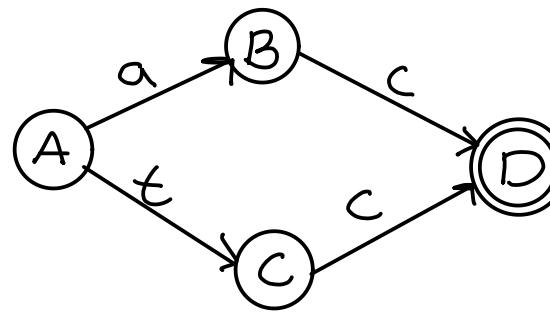
$C = \{4,5\}$ — —

$D = 6$ — —

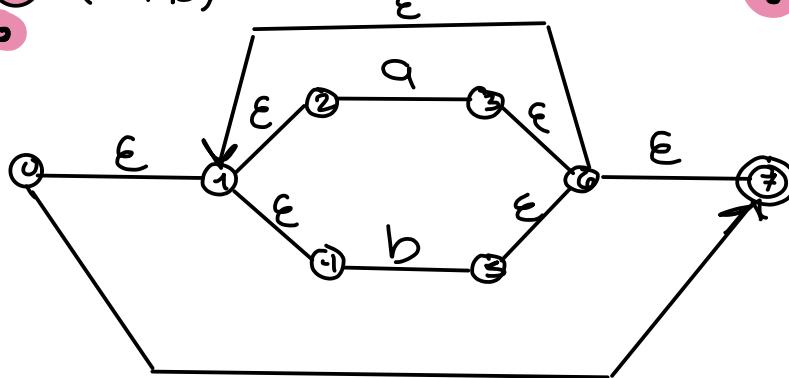
$D = 6$

$D = 6$

—



(a|b)*



	a	b	ϵ^*
0	—	—	{0, 1, 2, 7}
1	—	—	{1, 2, 4}
2	3	—	2
3	—	—	{3, 6, 7, 1, 2, 4}
4	—	5	4
5	—	—	{5, 6, 7, 1, 2, 4}
6	—	—	{6, 1, 2, 4, 7}
7	—	—	7

estados AFN

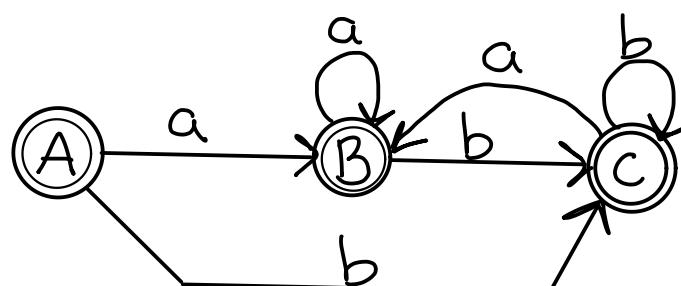
$a\epsilon^*$

$b\epsilon^*$

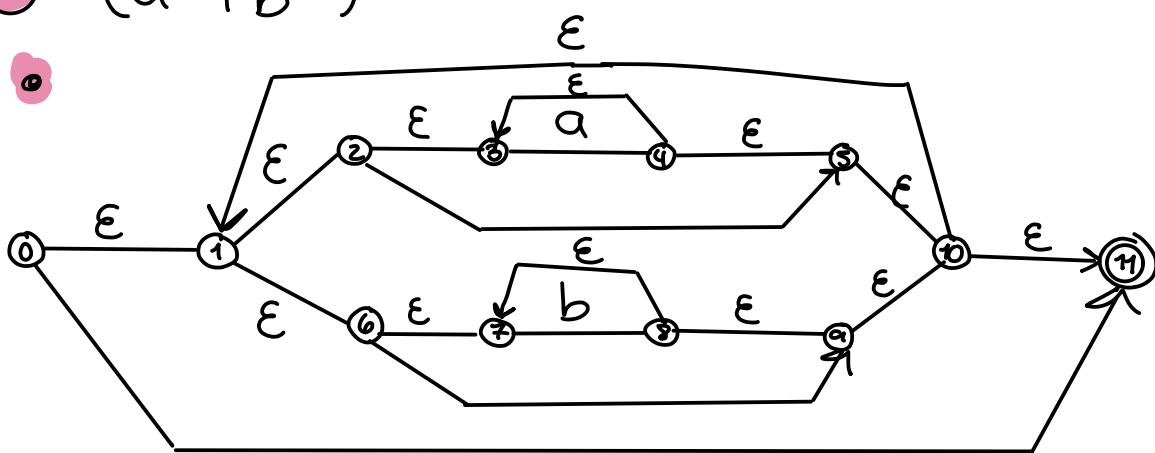
$$A = \{0, 1, 2, 7\} \quad \{1, 2, 3, 4, 6, 7\} = B \quad \{1, 2, 4, 5, 6, 7\} = C$$

$$B = \{1, 2, 3, 4, 6, 7\} \quad \{1, 2, 3, 4, 6, 7\} = B \quad \{1, 2, 4, 5, 6, 7\} = C$$

$$C = \{1, 2, 4, 5, 6, 7\} \quad \{1, 2, 3, 4, 6, 7\} = B \quad \{1, 2, 4, 5, 6, 7\} = C$$



c. $(a^* | b^*)^*$



6

	a	b	ϵ^*
0	—	—	{0, 1, 2, 3, 5, 10, 11, 6, 7, 9, 3}
1	—	—	{1, 2, 3, 5, 6, 7, 9, 10, 11}
2	—	—	{3, 5, 10, 11, 1, 2, 3, 6, 7, 9}
3	4	—	3
4	—	—	{4, 5, 10, 11, 1, 2, 3, 6, 7, 9}
5	—	—	{5, 10, 11, 1, 2, 3, 6, 7, 9}
6	—	—	{6, 7, 9, 10, 11, 1, 2, 3, 5, 6, 7, 9}
7	—	8	7
8	—	—	{8, 9, 10, 11, 1, 2, 3, 5, 6, 7, 9}
9	—	—	{9, 10, 11, 1, 2, 3, 5, 6, 7, 9}
10	—	—	{10, 11, 1, 2, 3, 5, 6, 7, 9}
11	—	—	11

• estados AFN

 $a \epsilon^*$ $b \epsilon^*$

$$A = \{0, 1, 2, 3, 5, 6, 7, 9, 10, 11\} \quad B = \{1, 2, 3, 4, 5, 6, 7, 9, 10, 11\} \quad C = \{1, 2, 3, 5, 6, 7, 8, 9, 10, 11\}$$

$$B = \{1, 2, 3, 4, 5, 6, 7, 9, 10, 11\}$$

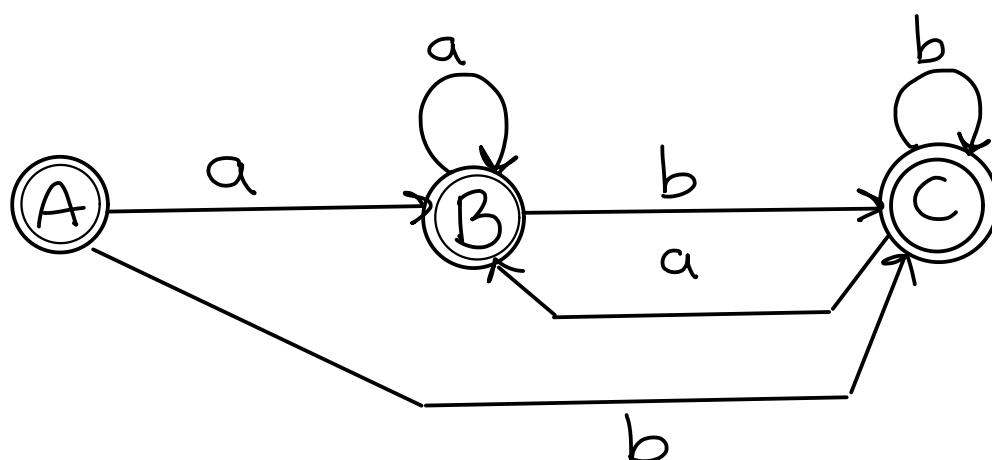
B

C

$$C = \{1, 2, 3, 5, 6, 7, 8, 9, 10, 11\}$$

B

C



(d) $((\varepsilon \mid a) \mid b^*)^*$

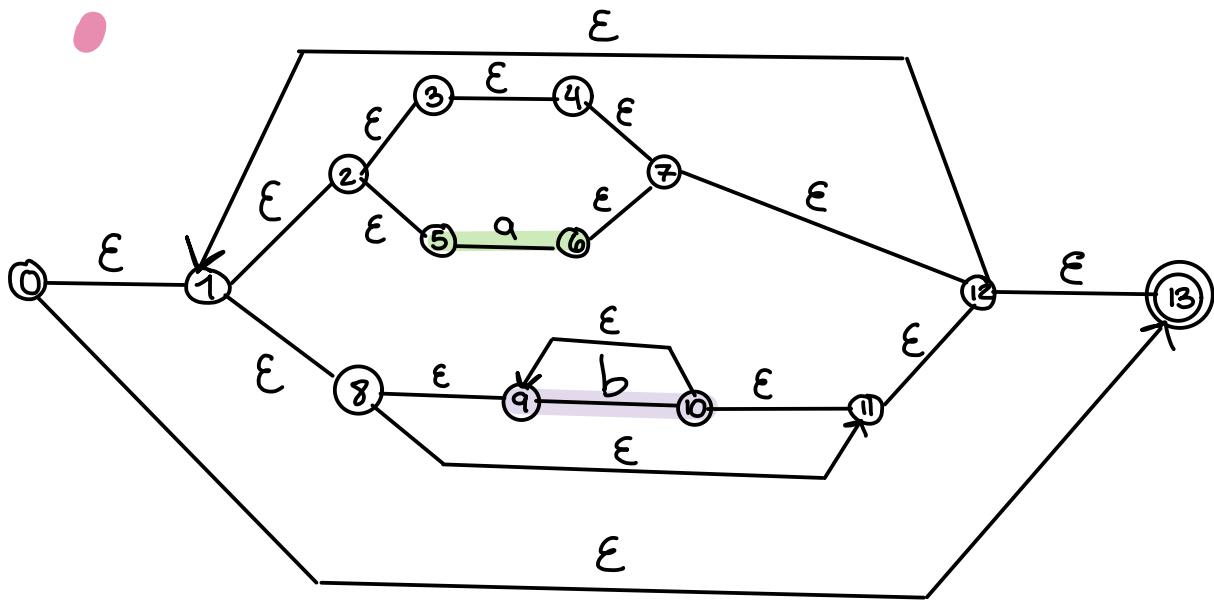
(e) $(a \mid b)^* abb(a \mid b)^*$

(f) $0? (1?)? 0^*$

(g) $\text{if} \setminus ([ae]^+ \setminus) \setminus ([ei]^+ \setminus) (\setminus n(\text{else} \setminus ([jl]^+))) ?$

(h) $[ae03]^+ @ [ae03]^+.(com \mid net \mid org).(gt \mid cr \mid co) ?$

d. $((\varepsilon \mid a) \mid b^*)^*$



	a	b	ε^*
0	-	-	{0, 1, 2, 3, 4, 5, 7, 12, 13, 8, 9, 11}
1	-	-	{1, 2, 3, 4, 5, 7, 8, 9, 11, 12, 13}
2	-	-	{1, 2, 3, 4, 5, 7, 8, 9, 11, 12, 13}
3	-	-	{1, 2, 3, 4, 5, 7, 8, 9, 11, 12, 13}
4	-	-	{3, 4, 7, 12, 13, 1, 2, 8, 11}
5	6	-	5
6	-	-	{6, 7, 12, 13, 1, 2, 3, 4, 5, 8, 11, 9}
7	-	-	{7, 12, 13, 1, 2, 3, 4, 5, 8, 11, 9}
8	-	-	{8, 9, 11, 12, 13, 1, 2, 3, 4, 5, 7}
9	-	10	9
10	-	-	{10, 9, 11, 12, 13, 1, 2, 3, 4, 5, 7, 8}
11	-	-	{11, 12, 13, 1, 2, 3, 4, 5, 7, 8, 9, 11}
12	-	-	{12, 13, 1, 2, 3, 4, 5, 7, 8, 9, 11}
13	-	-	13

• estados AFN

$a \in ^*$

$b \in ^*$

$$A = \{0, 1, 2, 3, 4, 5, 7, 8, 9, 11, 12, 13\} \quad B = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13\} \quad C = \{1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13\}$$

$$B = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13\}$$

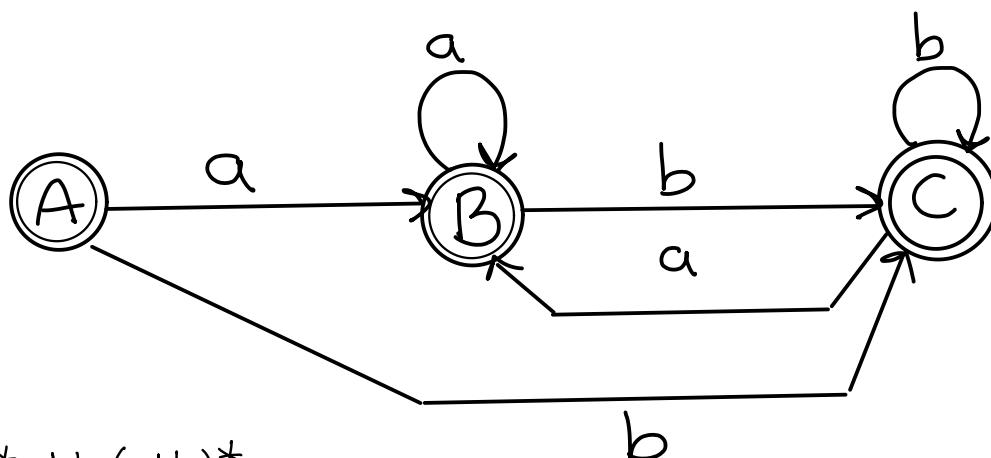
B

C

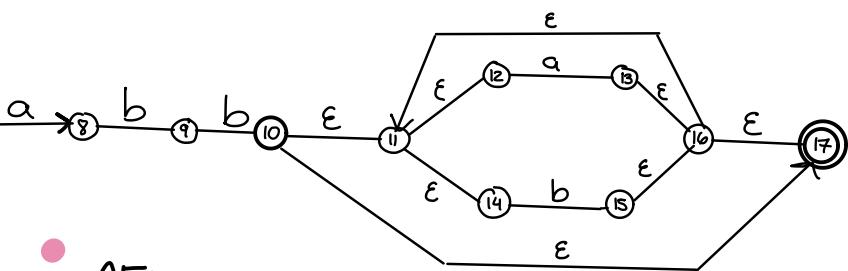
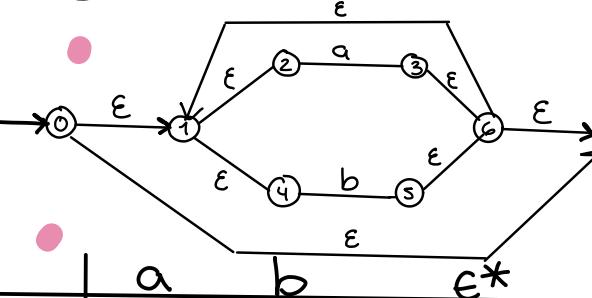
$$C = \{1, 2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13\}$$

B

C

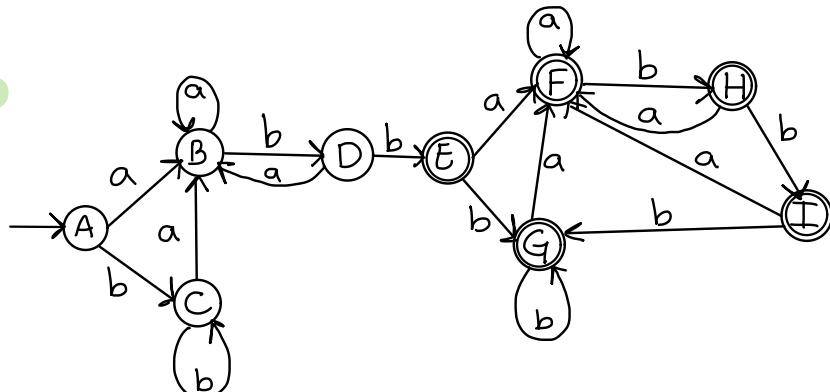


(e.) $(a|b)^*abb(a|b)^*$

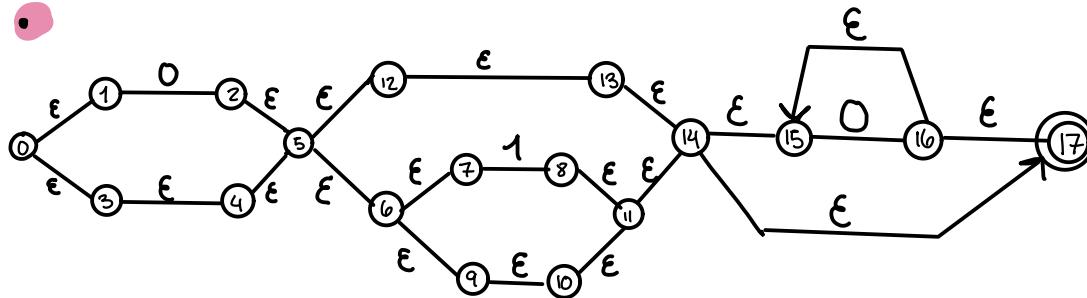


	a	b	ϵ^*
0	-	-	$\{0, 1, 2, 4, 7\}$
1	-	-	$\{1, 2, 4\}$
2	-	-	2
3	-	-	$\{3, 6, 7, 1, 2, 4\}$
4	-	-	4
5	-	-	$\{5, 6, 7, 1, 2, 4\}$
6	-	-	$\{6, 7\}$
7	-	-	$\{7\}$
8	-	-	$\{8\}$
9	-	-	$\{9\}$
10	-	-	$\{10, 11, 12, 14, 17\}$
11	-	-	$\{11, 12, 14\}$
12	-	-	$\{12\}$
13	-	-	$\{13, 16, 17, 11, 12, 14\}$
14	-	-	$\{14\}$
15	-	-	$\{15, 16, 17, 11, 12, 14\}$
16	-	-	$\{16, 11, 12, 14, 17\}$
17	-	-	17

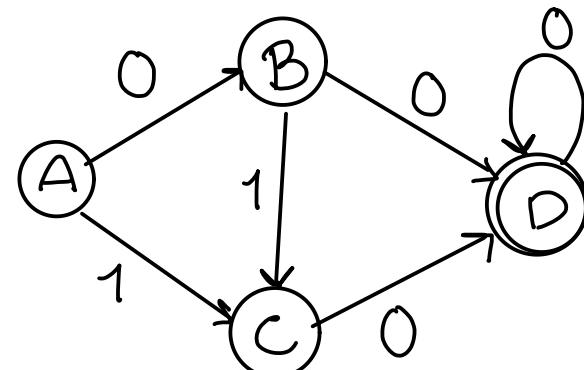
	AFN	$a \in ^*$	$b \in ^*$
A	$\{0, 1, 2, 4, 7\}$	$\{1, 2, 3, 4, 6, 7, 8\}$	$\{1, 2, 4, 5, 6, 7\}$
B	$\{1, 2, 3, 4, 6, 7, 8\}$	$\{1, 2, 3, 4, 6, 7, 8\}$	$\{1, 2, 4, 5, 6, 7, 9\}$
C	$\{1, 2, 4, 5, 6, 7\}$	$\{1, 2, 3, 4, 6, 7, 8\}$	$\{1, 2, 4, 5, 6, 7\}$
D	$\{1, 2, 4, 5, 6, 7, 9\}$	$\{1, 2, 3, 4, 6, 7, 8\}$	$\{1, 2, 4, 5, 6, 7, 9\}$
E	$\{1, 2, 4, 5, 6, 7, 8\}$	$\{1, 2, 3, 4, 6, 7, 8\}$	$\{1, 2, 4, 5, 6, 7, 8\}$
F	$\{1, 2, 3, 4, 6, 7, 8, 11, 12, 13, 14, 16, 17\}$	$\{1, 2, 3, 4, 6, 7, 8, 11, 12, 13, 14, 16, 17\}$	$\{1, 2, 4, 5, 6, 7, 11, 12, 14, 15, 16, 17\}$
G	$\{1, 2, 4, 5, 6, 7, 11, 12, 14, 15, 16, 17\}$	$\{1, 2, 4, 5, 6, 7, 11, 12, 14, 15, 16, 17\}$	$\{1, 2, 4, 5, 6, 7, 9, 11, 12, 14, 15, 16, 17\}$
H	$\{1, 2, 4, 5, 6, 7, 9, 11, 12, 14, 15, 16, 17\}$	$\{1, 2, 4, 5, 6, 7, 9, 11, 12, 14, 15, 16, 17\}$	$\{1, 2, 4, 5, 6, 7, 9, 11, 12, 14, 15, 16, 17\}$
I	$\{1, 2, 4, 5, 6, 7, 10, 11, 12, 14, 15, 16, 17\}$	$\{1, 2, 4, 5, 6, 7, 10, 11, 12, 14, 15, 16, 17\}$	$\{1, 2, 4, 5, 6, 7, 10, 11, 12, 14, 15, 16, 17\}$



f) $O? (1?)? O^*$



	0	1	ϵ^*
0	—	—	{0, 1, 3, 4, 5, 12, 6, 7, 9, 10, 11, 14, 15, 17}
1	2	—	1
2	—	—	{2, 5, 12, 6, 7, 9, 10, 11, 13, 14, 15, 17}
3	—	—	{3, 4, 5, 12, 6, 7, 9, 10, 11, 13, 14, 15, 17}
4	—	—	{4, 5, 12, 6, 7, 9, 10, 11, 13, 14, 15, 17}
5	—	—	{5, 12, 6, 7, 9, 10, 11, 13, 14, 15, 17}
6	—	—	{7, 9, 10, 11, 14, 17, 15}
7	—	8	7
8	—	—	{8, 11, 14, 15, 17}
9	—	—	{9, 10, 11, 14, 15, 17}
10	—	—	{10, 11, 14, 15, 17}
11	—	—	{11, 14, 15, 17}
12	—	—	{12, 13, 14, 15, 17}
13	—	—	{13, 14, 15, 17}
14	—	—	{14, 15, 17}
15	16	—	15
16	—	—	{15, 16, 17}
17	—	—	17



estados AFN

$O\epsilon^*$

$1\epsilon^*$

$$A = \{0, 1, 3, 4, 5, 12, 6, 7, 9, 10, 11, 14, 15, 17\} \quad B = \{2, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 17\} \quad C = \{8, 11, 14, 15, 17\}$$

$$B = \{2, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 17\} \quad D = \{15, 16, 17\}$$

$$C = \{8, 11, 14, 15, 17\}$$

C

$$D = \{15, 16, 17\}$$

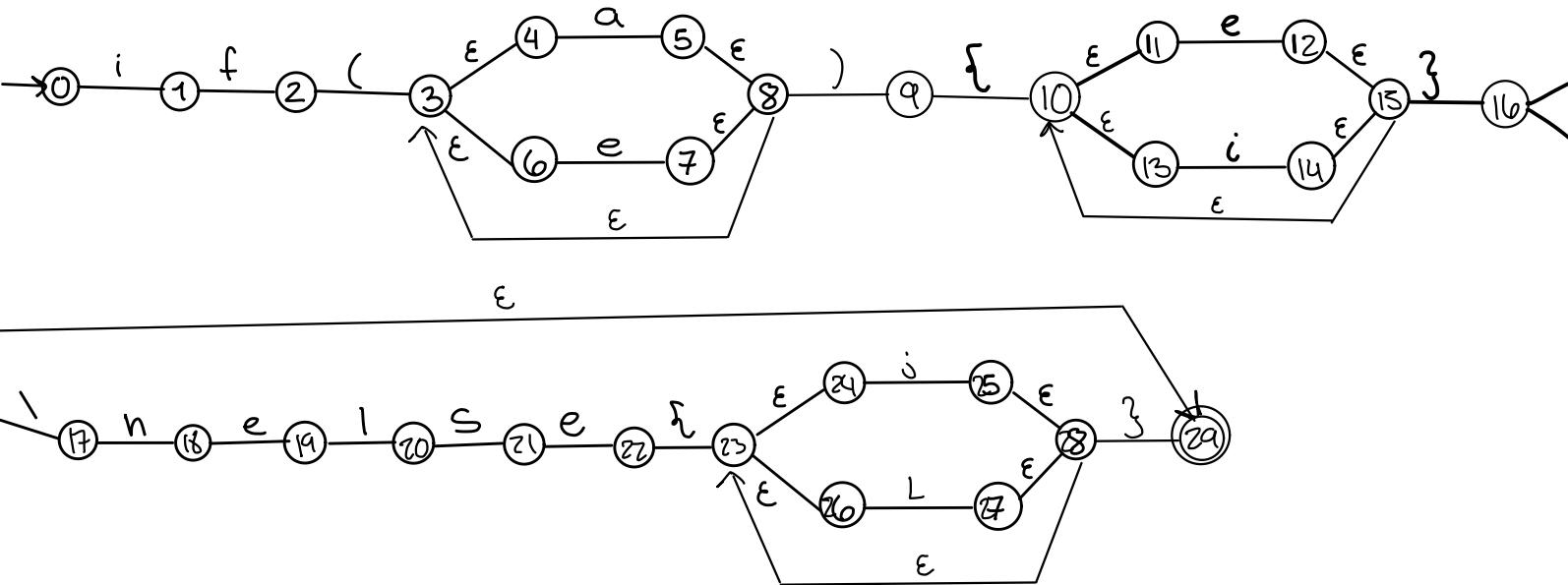
D

D

⑨ if \([ae]^+\) \{ [ei]^+ \} (\ln (else \{ [j] \}))?

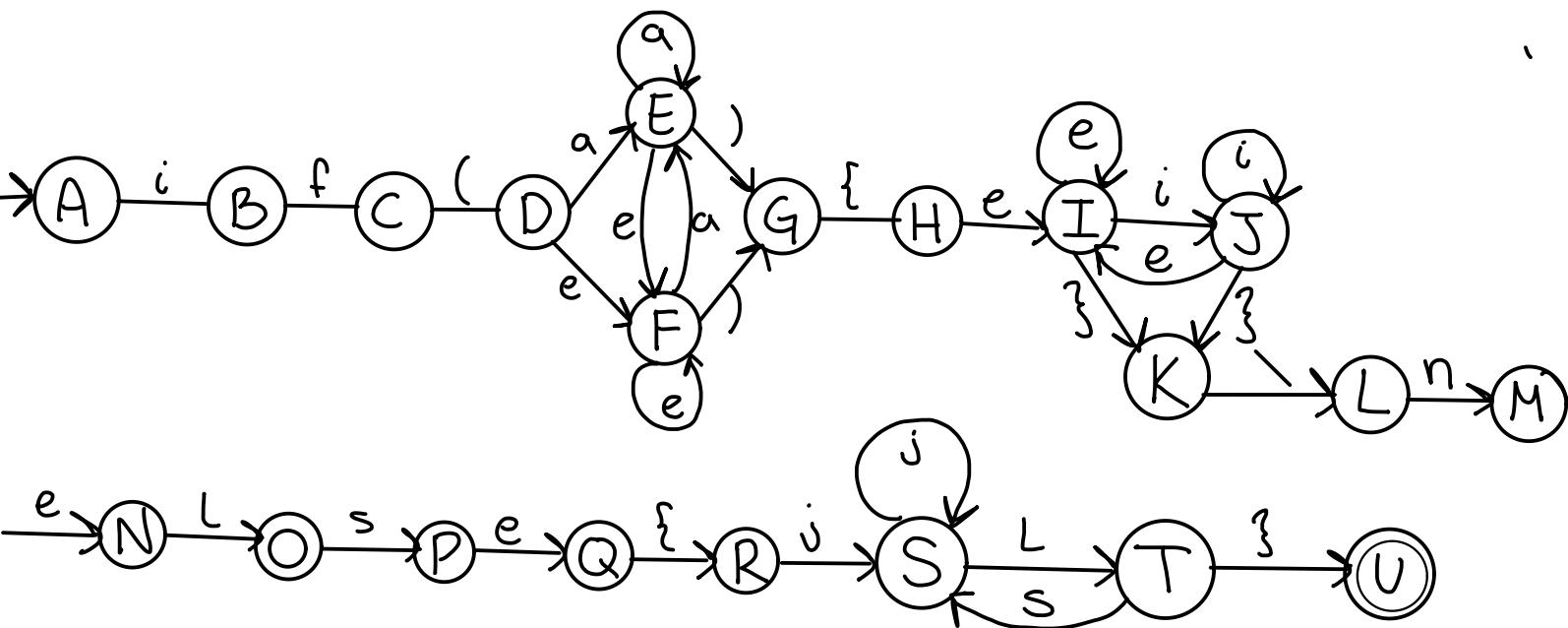
(g) if \(([ae]^+ \backslash \{ [ei]^+ \} \backslash n (\text{else} \{ [jl]^+ \})) ?

(\n else{(j||l)+})?

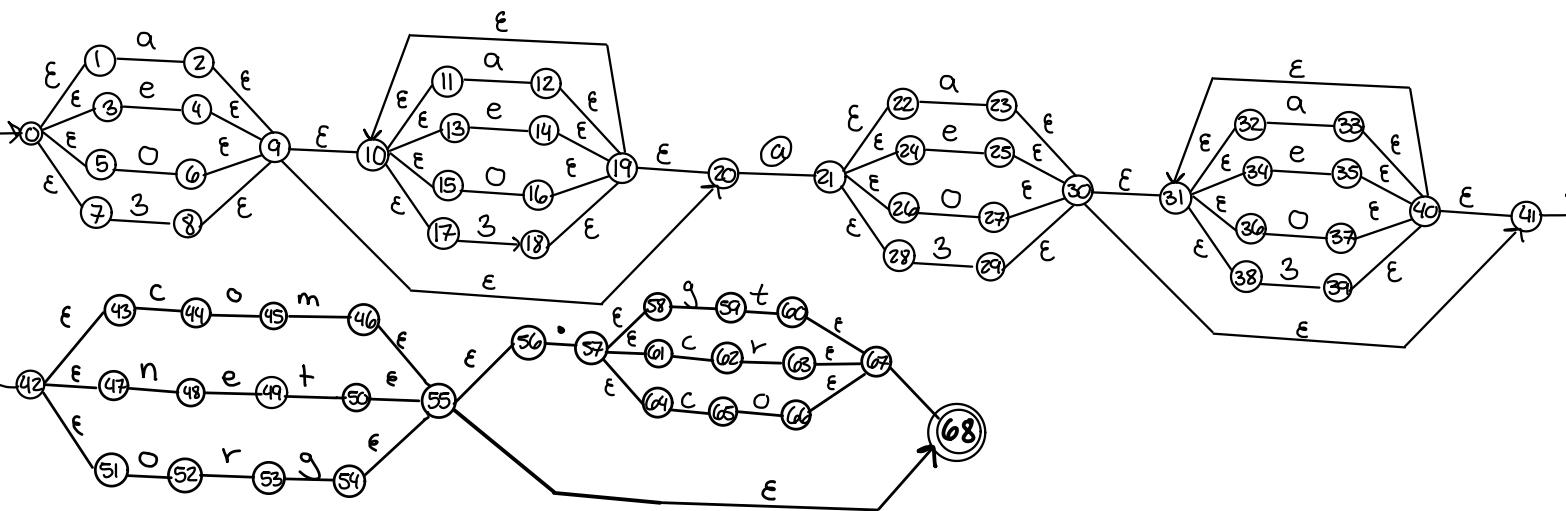


• estados AFN

	i	f	(a	e)	{	}	\	n		s	j	E
A	0	B												
B	1		C											
C	2		D											
D	3,4,6			E	F									
E	3,4,5,6,8			E	F	G ~								
F	3,4,6,7,8			E	F	G								
G	9					H								
H	10,11,13					I								
I	10,11,12,13,15	J				I			K					
J	10,11,13,14,15	J				I			K					
K	16,29								L					
L	17								M					
M	18			N					O				P	
N	19													
O	20													
P	21			Q			R							
Q	22													
R	23,24,26											S		
S	23,24,25,26,28								T			S		
T	23,24,26,27,28								T			S		
U	29													



h) [ae03]⁺@[ae03]⁺.(com|net|org)(.(g+cr|co))?

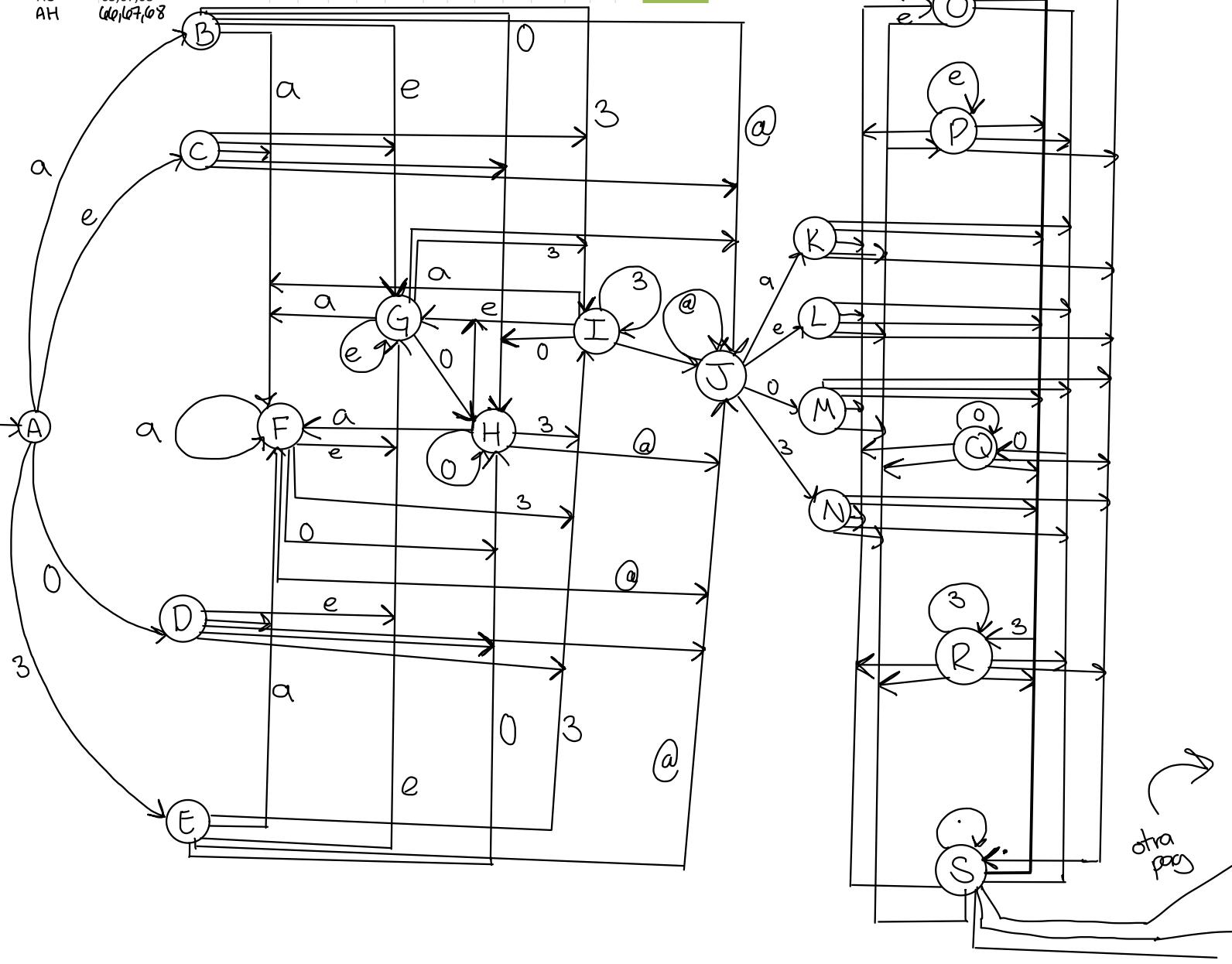


DFA_State	FA_Closure	a	e	0	3	.	@	.	c	n	o	m	t	r	g	Accepting
D0																
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excel

Letra	estados AFN	aE*	eE*	OE*	3E*	@E*	.E*	cE*	nE*	oE*	mE*	tE*	rE*	gE*	Accepting
A	0,1,3,5,7	B	C	D	E										
B	2,9,10,11,13,15,17,20	F	G	H	I	J									
C	4,9,10,11,13,15,17,20	F	G	H	I	J									
D	6,9,10,11,13,15,17,20	F	G	H	I	J									
E	8,9,10,11,13,15,17,20	F	G	H	I	J									
F	10,11,12,13,15,17,19,20	F	G	H	I	J									
G	10,11,13,14,15,17,19,20	F	G	H	I	J									
H	10,11,13,15,16,17,19,20	F	G	H	I	J									
I	10,11,13,15,17,18,19,20	F	G	H	I	J									
J	21,22,24,26,28	K	L	M	N										
K	23,30,31,32,34,36,38,41	O	P	Q	R	S									
L	25,30,31,32,34,36,38,41	O	P	Q	R	S									
M	27,30,31,32,34,36,38,41	O	P	Q	R	S									
N	29,30,31,32,34,36,38,41	O	P	Q	R	S									
O	31,32,33,34,36,38,40,41	O	P	Q	R	S									
P	31,32,34,35,36,38,40,41	O	P	Q	R	S									
Q	31,32,34,36,37,38,40,41	O	P	Q	R	S									
R	31,32,34,36,38,39,40,41	O	P	Q	R	S									
S	42,43,47,51			T	U	V									
T		44		X											
U		48	γ 49												
V		52					Z								
W	50,55,56,68			AA											
X		45					AB								
Y		49					W								
Z		53					AC								
AA	57,58,61,64			AD			AD								
AB	46,55,56,68			AE											
AC	54,55,56,68			AA											
AD		59		AA											
AE	62,65														
AF	60,67,68														
AG	63,67,68														
AH	(60,67,68)														

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