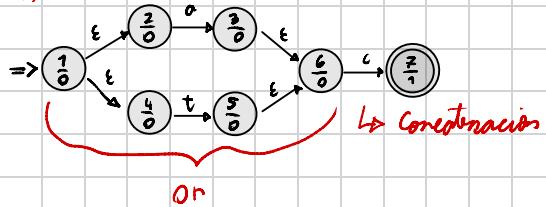


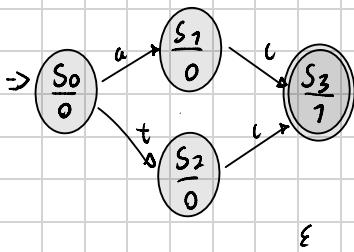
**Ejercicio No. 1 (25%)** – Convierta las siguientes expresiones regulares en autómatas finitos deterministas (para ello deberá primero convertir las expresiones regulares a AFN y luego convertir a AFD). Muestre todo su procedimiento, i.e., AFN construido con Thompson, tabla de transición, conversión a AFD. Para el inciso g, interprete \ como un escape de carácter, i.e., \(\) significa que su regex reconoce el carácter .

- a)  $(a|t)c$
- b)  $(a|b)^*$
- c)  $(a^*|b^*)^*$
- d)  $((\varepsilon|a)|b^*)^*$
- e)  $(a|b)^*abb(a|b)^*$
- f)  $0? (1?)? 0^*$
- g)  $if\backslash([ae]+)\backslash([ei]+\backslash)(\backslash(n(else\backslash([jl]+\backslash))))?$
- h)  $[ae03] + @ [ae03] . (com|net|org) . (gt|cr|co)?$

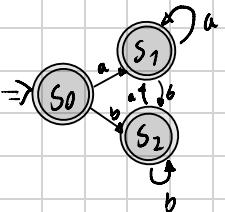
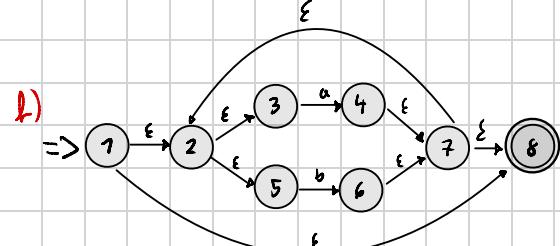
a)



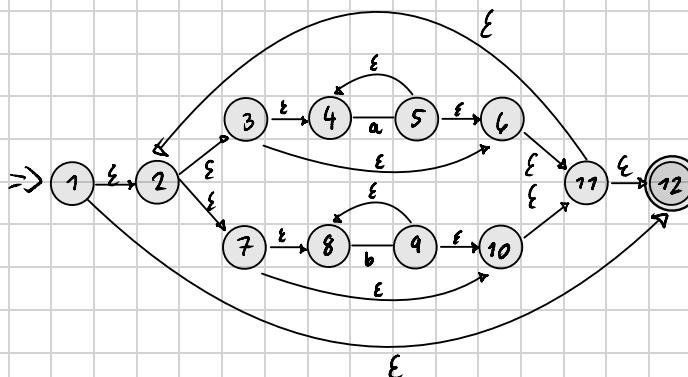
Estado	a	t	c	$\varepsilon$
1				2,4
2	3			
3				6
4		5		
5				6
6				7



$$\begin{aligned}
 S_0 &= \varepsilon^* \{1\} = \{1, 2, 4\} \\
 S_1 &= \varepsilon^*(f(S_0, a)) = \varepsilon^* \{3\} = \{3, 6\} \\
 S_2 &= \varepsilon^*(f(S_0, t)) = \varepsilon^* \{5\} = \{5, 6\} \\
 S_3 &= \varepsilon^*(f(S_1, c)) = \varepsilon^* \{7\} = \{7\} \\
 \varepsilon^*(f(S_2, c)) &= \varepsilon^* \{7\} = S_3
 \end{aligned}$$



Estado	a	b	$\varepsilon$	$S_0 = \varepsilon^* \{7\} = \{1, 2, 3, 5, 8\}$
1			2,8	$S_1 = \varepsilon^*(f(S_0, a)) = \varepsilon^* \{4\} = \{4, 7, 8, 2, 3, 5\}$
2			3,5	$S_2 = \varepsilon^*(f(S_0, b)) = \varepsilon^* \{6\} = \{6, 7, 8, 2, 3, 5\}$
3	4			$\varepsilon^*(f(S_1, a)) = \varepsilon^* \{4\} = S_1$
4			7	$\varepsilon^*(f(S_1, b)) = \varepsilon^* \{6\} = S_2$
5			6	$\varepsilon^*(f(S_2, a)) = \varepsilon^* \{4\} = S_1$
6			7	$\varepsilon^*(f(S_2, b)) = \varepsilon^* \{6\} = S_2$
7				



Estado	a	b	$\epsilon$
1			2, 12
2			3, 7
3			4, 6
4	5		
5			4, 6
6			11, 2
7			8, 10
8	9		
9			8, 10
10			11, 2
11			12

$$S_0 = \epsilon^* \{ 7 \} = \{ 1, 2, 3, 7, 4, 6, 10, 11, 12 \}$$

$$S_1 = \epsilon^* (f(S_0, a)) = \epsilon^* \{ 5 \} = \{ 5, 6, 4, 11, 2, 3, 7, 8, 10, 12 \}$$

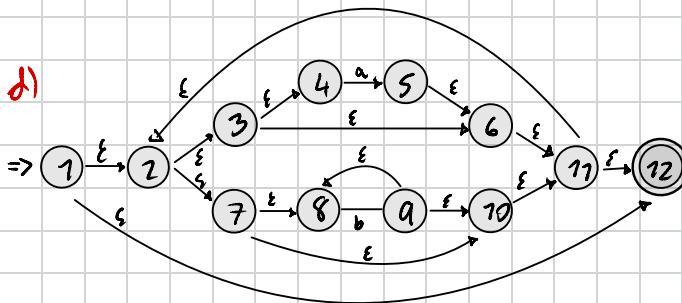
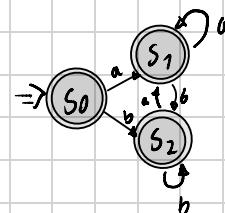
$$S_2 = \epsilon^* (f(S_0, b)) = \epsilon^* \{ 9 \} = \{ 9, 10, 8, 11, 2, 3, 7, 6, 4, 12 \}$$

$$\epsilon^* (f(S_1, a)) = \epsilon^* \{ 5 \} = S_1$$

$$\epsilon^* (f(S_1, b)) = \epsilon^* \{ 9 \} = S_2$$

$$\epsilon^* (f(S_2, a)) = \epsilon^* \{ 5 \} = S_1$$

$$\epsilon^* (f(S_2, b)) = \epsilon^* \{ 9 \} = S_2$$



Estado	a	b	$\epsilon$
1			2, 12
2			3, 7
3			4, 6
4	5		
5			6
6			11
7			8, 10
8	9		
9			8, 10
10			11
11			2, 12

$$S_0 = \epsilon^* \{ 7 \} = \{ 1, 2, 3, 4, 6, 7, 8, 10, 11, 12 \}$$

$$S_1 = \epsilon^* (f(S_0, a)) = \epsilon^* \{ 5 \} = \{ 5, 6, 7, 11, 2, 3, 7, 9, 10, 4, 12 \}$$

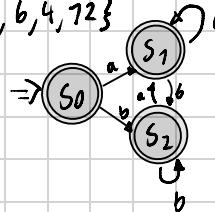
$$S_2 = \epsilon^* (f(S_0, b)) = \epsilon^* \{ 9 \} = \{ 9, 10, 8, 11, 2, 3, 7, 6, 4, 12 \}$$

$$\epsilon^* (f(S_1, a)) = \epsilon^* \{ 5 \} = S_1$$

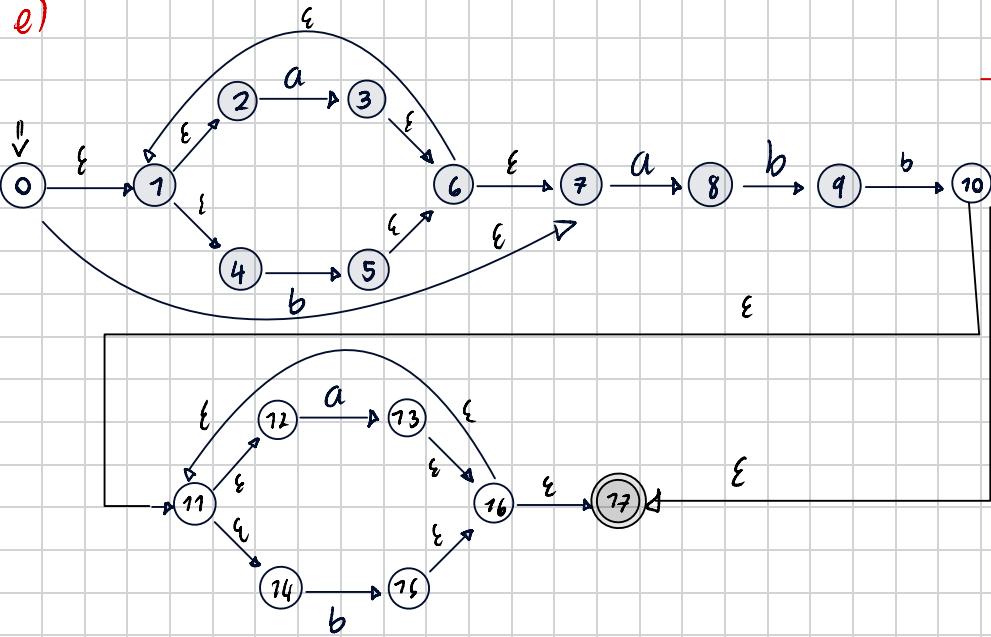
$$\epsilon^* (f(S_1, b)) = \epsilon^* \{ 9 \} = S_2$$

$$\epsilon^* (f(S_2, a)) = \epsilon^* \{ 5 \} = S_1$$

$$\epsilon^* (f(S_2, b)) = \epsilon^* \{ 9 \} = S_2$$



e)



Estado	a	b	$\epsilon$
0			1, 7
1			2, 4
2	3		
3			6
4	5		
5			6
6			7, 7
7	8		
8			9
9			70
10			71, 77
11			12, 74
12	13		
13			71
14			75
15			76
16			11, 17

$$S_0 = \epsilon^* \{0\} = \{0, 7, 2, 4, 73\}$$

$$S_1 = \epsilon^* (\{S_0, a\}) = \epsilon^* \{3, 8\} = \{3, 6, 7, 7, 2, 4, 8\}$$

$$S_2 = \epsilon^* (\{S_0, b\}) = \epsilon^* \{5\} = \{5, 6, 7, 7, 2, 4\}$$

$$\epsilon^* (\{S_1, a\}) = \epsilon^* \{3, 8\} = S_1$$

$$S_3 = \epsilon^* (\{S_1, b\}) = \epsilon^* \{5, 9\} = \{5, 6, 7, 7, 2, 4, 9\}$$

$$\epsilon^* (\{S_2, a\}) = \epsilon^* \{3, 8\} = S_1$$

$$\epsilon^* (\{S_2, b\}) = \epsilon^* \{5\} = S_2$$

$$\epsilon^* (\{S_3, a\}) = \epsilon^* \{3, 8\} = S_1$$

$$S_4 = \epsilon^* (\{S_3, b\}) = \epsilon^* \{5, 10\} = \{5, 6, 7, 7, 2, 4, 10, 71, 72, 74, 77\}$$

$$S_5 = \epsilon^* (\{S_4, a\}) = \epsilon^* \{3, 8, 73\} = \{3, 6, 7, 2, 4, 7, 8, 76, 71, 72, 74, 77\}$$

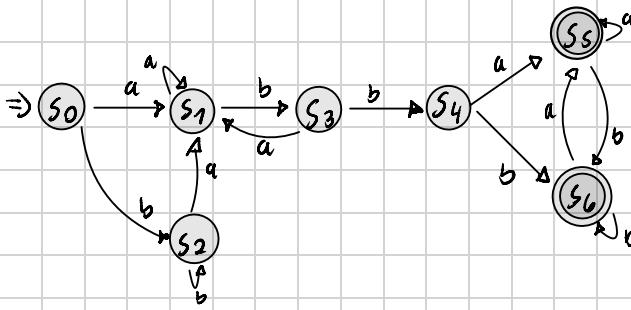
$$S_6 = \epsilon^* (\{S_4, b\}) = \epsilon^* \{5, 75\} = \{5, 6, 7, 7, 2, 4, 75, 76, 71, 72, 74, 77\}$$

$$\epsilon^* (\{S_5, a\}) = \epsilon^* \{3, 8, 73\} = S_5$$

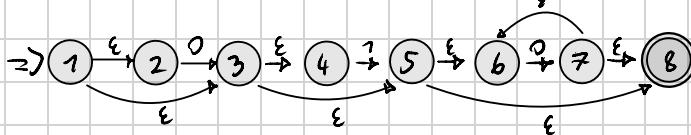
$$\epsilon^* (\{S_5, b\}) = \epsilon^* \{5, 75\} = S_6$$

$$\epsilon^* (\{S_6, a\}) = \epsilon^* \{3, 8, 73\} = S_5$$

$$\epsilon^* (\{S_6, b\}) = \epsilon^* \{5, 75\} = S_6$$



1)



$$S_0 = \epsilon^* \{S_0\} = \{2, 3, 4, 5, 6, 8\}$$

$$S_1 = \epsilon^* (\{f(S_0, 0)\}) = \epsilon^* \{3, 7\} = \{3, 4, 5, 6, 8\}$$

$$S_2 = \epsilon^* (\{f(S_1, 0)\}) = \epsilon^* \{5\} = \{5, 6, 8\}$$

$$S_3 = \epsilon^* (\{f(S_1, 0)\}) = \epsilon^* \{7\} = \{6, 8\}$$

$$\epsilon^* (f(S_1, 1)) = \epsilon^* \{5\} = S_2$$

$$\epsilon^* (f(S_2, 0)) = \epsilon^* \{7\} = S_3$$

$$\epsilon^* (f(S_2, 1)) = \text{no se puele}$$

Estado	0	1	$\epsilon$
1			2, 3
2	3		
3			4, 5
4		5	
5			6, 8
6	7		
7			6, 8

