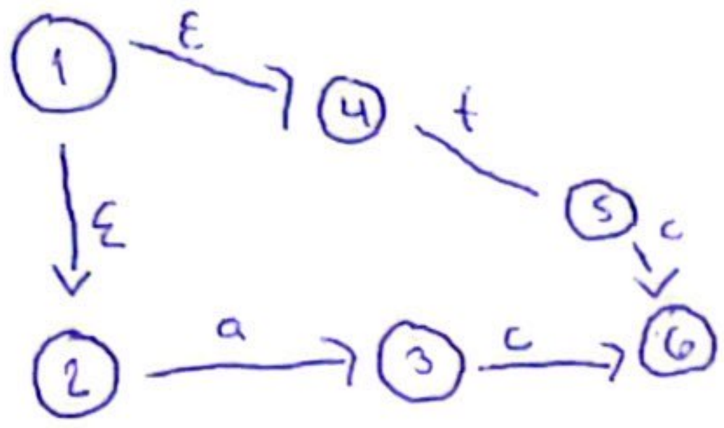
Ejercicio 1.

a) (alt)c



Estado	a	t	c	ε
1	-	-	-	2,4
2	3	-	-	-
3	-	-	6	-
4	-	5	-	-
5	-	-	6	-
6	-	-	-	-

AFN → AFD

(1) = {ε-closure(1)} = {1,2,4}

{1,2,4} = a → {ε-closure(3)} = {3}
t → {ε-closure(5)} = {5}

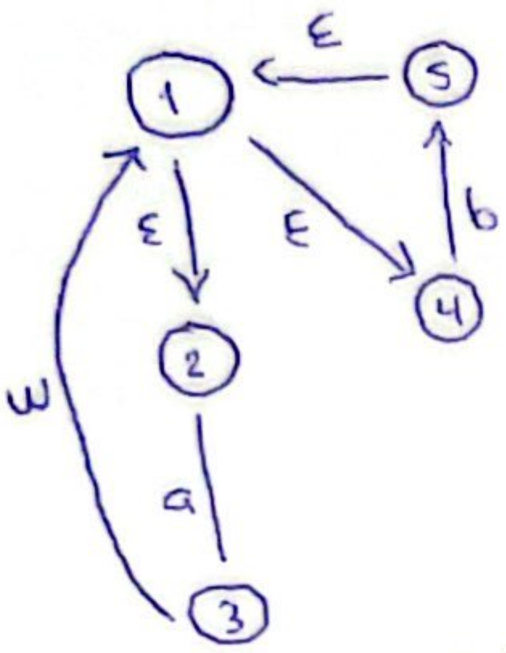
{3} = c {ε-closure(6)} = {6}

{5} = c {ε-closure(6)} = {6}

AFN	a	t	c	ε
{1,2,4}	A	{3}	{5}	-
{3}	B	-	-	{6}
{5}	C	-	-	{6}
{6}	D	-	-	-

Estado	a	t	c
A	B	C	-
B	-	-	D
C	-	-	D
D	-	-	-

b) $(a|b)^*$



Estado	a	b	ε
1	-	-	2,4
2	3	-	-
3	-	-	1
4	-	5	-
5	-	-	1

AFN -> AFD

$\{1\} = \{\varepsilon\text{-closure}(1)\} = \{1,2,4\}$

$\{1,2,3\} = a \rightarrow \{\varepsilon\text{-closure}(3)\} = \{5\}$

$b \rightarrow \{\varepsilon\text{-closure}(5)\} = \{5\}$

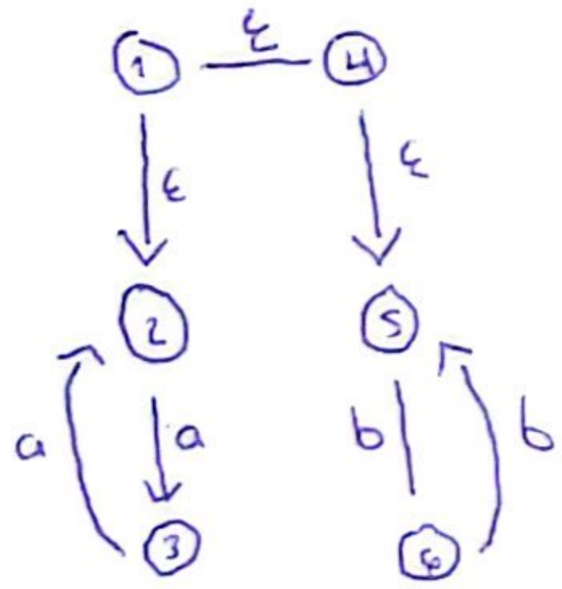
$\{3\} = a \rightarrow \{\varepsilon\text{-closure}(3)\} = \{3\}$

$\{5\} = b \rightarrow \{\varepsilon\text{-closure}(5)\} = \{5\}$

AFN	AFD	a	b
{1,2,4}	A	3	5
{3}	B	3	5
{5}	C	3	5

Estado	a	b
A	B	C
B	B	C
C	B	C

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



Estado	a	b	ε
1	-	-	2,4
2	3	-	-
3	2	-	-
4	-	-	5
5	-	6	-
6	-	5	-

AFN -> AFD

$\{1\} = \{\varepsilon\text{-closure}(1)\} = \{1,2,4,5\}$

$\{1,2,4,5\} = a\ \{\varepsilon\text{-closure}(3)\} = \{3\}$

$\{1,2,4,5\} = b\ \{\varepsilon\text{-closure}(6)\} = \{6\}$

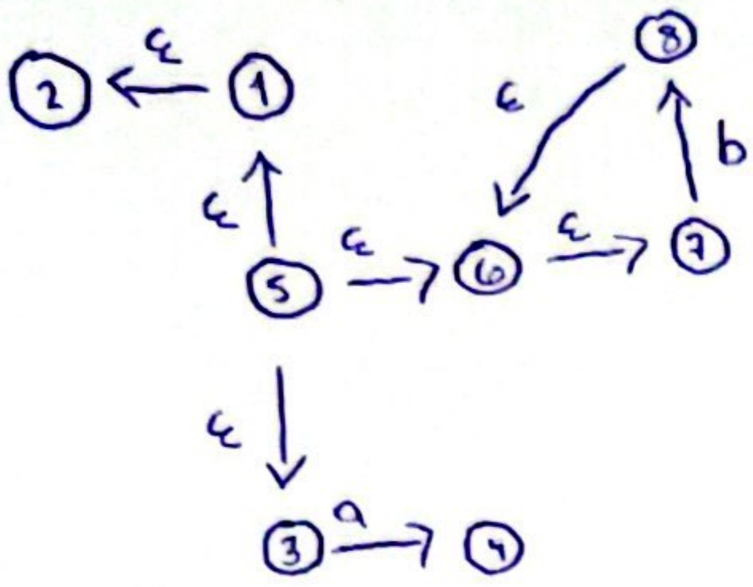
$\{3\} = a\ \{\varepsilon\text{-closure}(2)\} = \{2,3\}$

$\{6\} = b\ \{\varepsilon\text{-closure}(5)\} = \{5,6\}$

AFN	a	b
1,2,4,5	2,3	5,6
2,3	2,3	5,6
5,6	2,3	5,6

Estado	a	b
A	B	C
B	B	C
C	B	C

d) ((ε|a)|b*)*



AFN → AFD

Estado	a	b	ε
1	-	-	2
2	-	-	-
3	4	-	-
4	-	-	-
5	-	-	1,3,6
6	-	-	7
7	-	8	-
8	-	-	6

{5} = {ε-closure(5)} = {1,2,3,4,5,6,7}

{1,2,3,4,5,6,7} = a → {ε-closure(4)} = {4}
b → {ε-closure(8)} = {8,6,7}

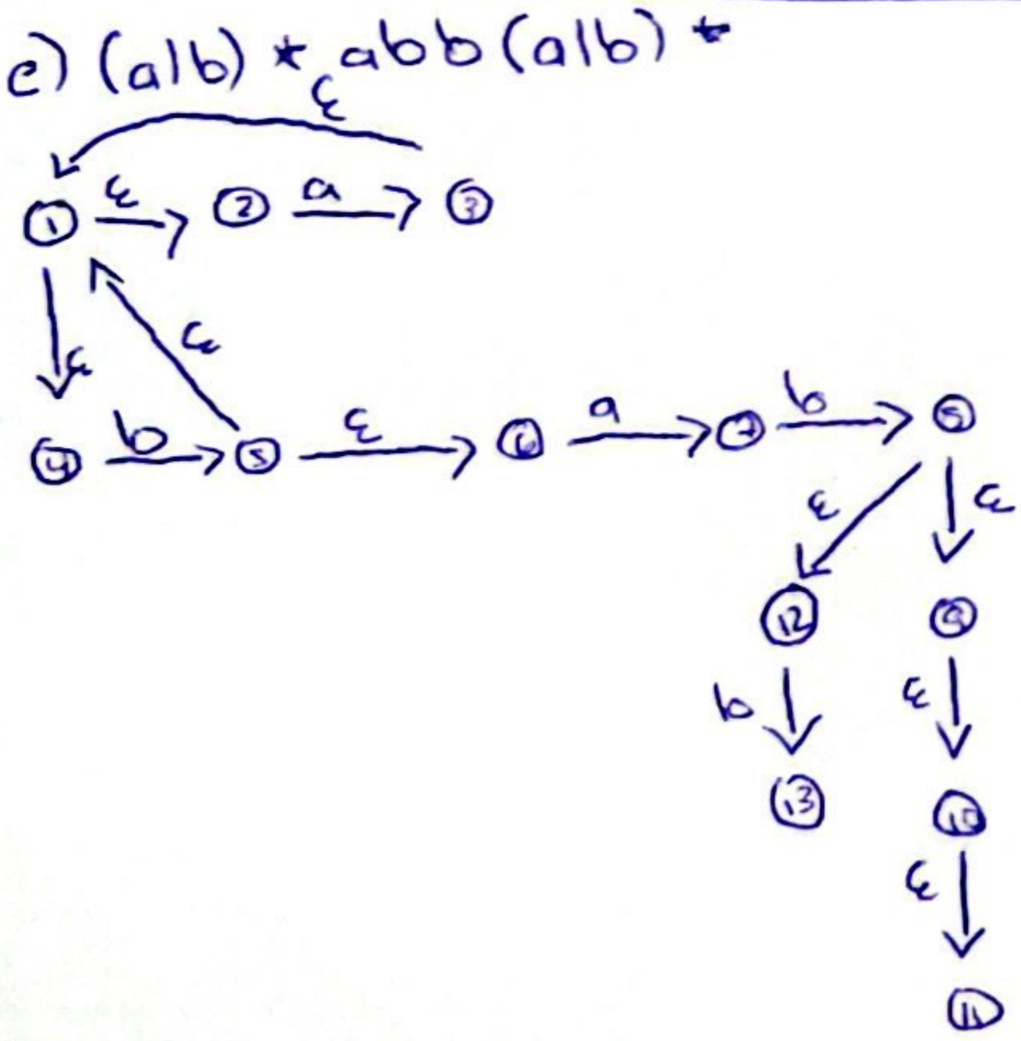
{4} = a{}

{8,6,7} = b → {ε-closure(8)} = {8,6,7}

AFN	AFD	a	b
1,2,3,4,5,6,7	A	4	8,6,7
4	B	-	-
8,6,7	C	-	8,6,7

AFN	a	b
A	B	C
B	-	-
C	-	C

e) (a|b)*abb(a|b)*



{1} = {ε-closure(1)} = {1,2,4}

{1,2,4} = a → {ε-closure(3)} = {3}
b → {ε-closure(5)} = {5}

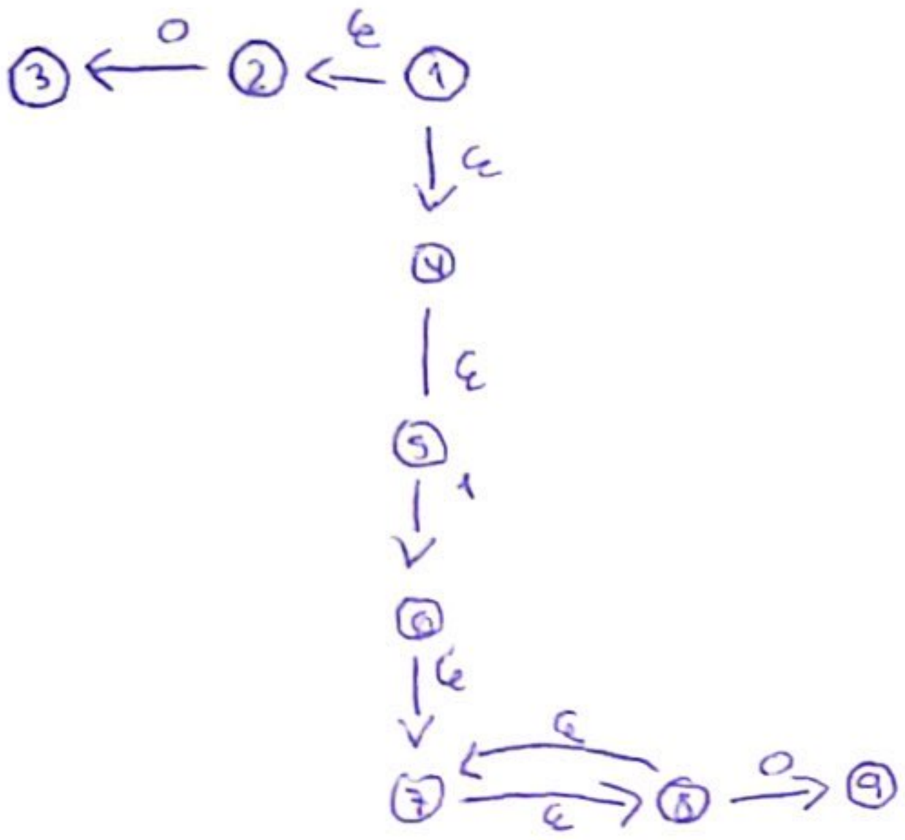
{8,9,10,12} = a → {ε-closure(11)} = {11}
b → {ε-closure(13)} = {13}

Estado	a	b	ε
1	-	-	2,4
2	3	-	-
3	-	-	1
4	-	5	-
5	-	-	-
6	7	-	-
7	-	-	-
8	-	8	-
9	-	-	9,12
10	11	-	10,12
11	-	-	-
12	-	13	-
13	-	-	-

AFN	AFD	a	b
1,2,4	A	3	5
3	B	1,2,4,3	5
5	C	-	8,9,10,12
8,9,10,12	D	11	13
1,2,4,3	E	1,2,4,3	5
11	F	1,2,4,3	5
13	G	1,2,4,3	5

Estado	a	b
A	B	C
B	E	C
C	-	D
D	F	G
E	E	C
F	E	C
G	E	C

f) 0?(1?)?0*



Estado	0	1	ε
1	-	-	2,4
2	3	-	-
3	-	-	-
4	-	-	5
5	-	6	-
6	-	-	7
7	-	-	8
8	-	-	7
9	-	-	-

$\{1\} = \{\varepsilon\text{-closure}(1)\} = \{1,2,4\}$

$\{1,2,4\} = 0 \rightarrow \{\varepsilon\text{-closure}(3)\} = \{3\}$

$1 \rightarrow \{\varepsilon\text{-closure}(6)\} = \{6\}$

$\{3\} = 0 \rightarrow \{\varepsilon\text{-closure}(9)\} = \{9\}$

$\{6\} = 0 \rightarrow \{\varepsilon\text{-closure}(8)\} = \{8\}$

$\{9\} = 0\{\varepsilon\text{-closure}(7,8)\} = \{7,8\}$

$\{8\} = 0\{\varepsilon\text{-closure}(9)\} = \{9\}$

AFN	AFD	0	1
1,2,4	A	3	6
3	B	9	-
6	C	8	-
9	D	7,8	-
8	E	9	-
7,8	F	9	-

Estado	0	1
A	B	C
B	D	-
C	E	-
D	F	-
E	D	-
F	D	-