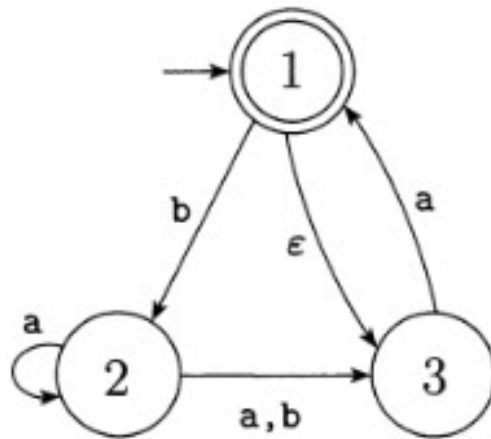


AFD – Autômato Finito Determinístico

AFN – Autômato Finito Não Determinístico



$N = (\{1,2,3\}, \{a,b\}, \delta, 1, \{1\})$

	<i>a</i>	<i>b</i>	ϵ
1	-	{2}	{3}
2	{2, 3}	{3}	-
3	{1}	-	-

$q_0 = \langle 1,3 \rangle$
 $\delta(\langle 1,3 \rangle, a) = \langle 1,3 \rangle$
 $\delta(\langle 1,3 \rangle, b) = \langle 2 \rangle$

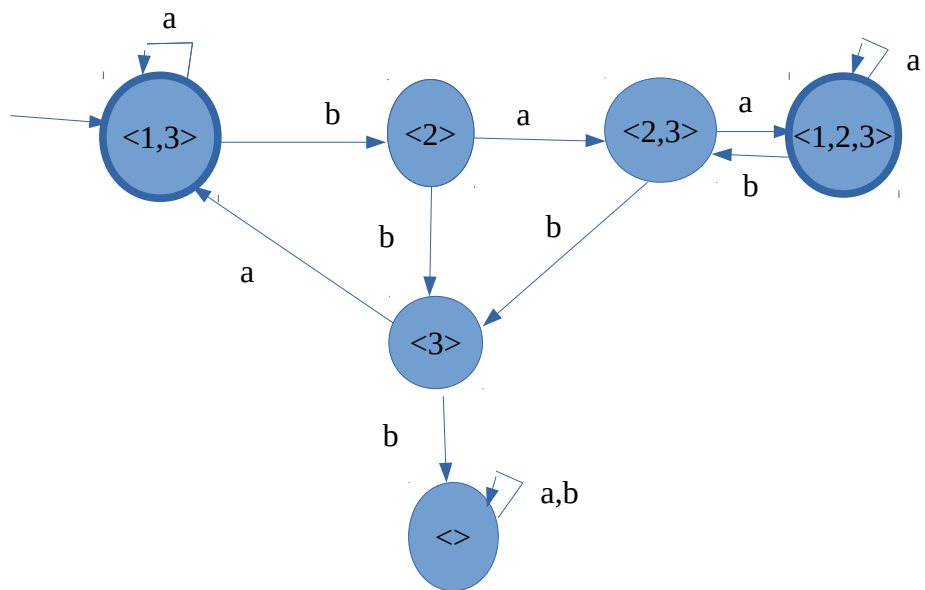
$\delta(\langle 2 \rangle, a) = \langle 2,3 \rangle$
 $\delta(\langle 2 \rangle, b) = \langle 3 \rangle$

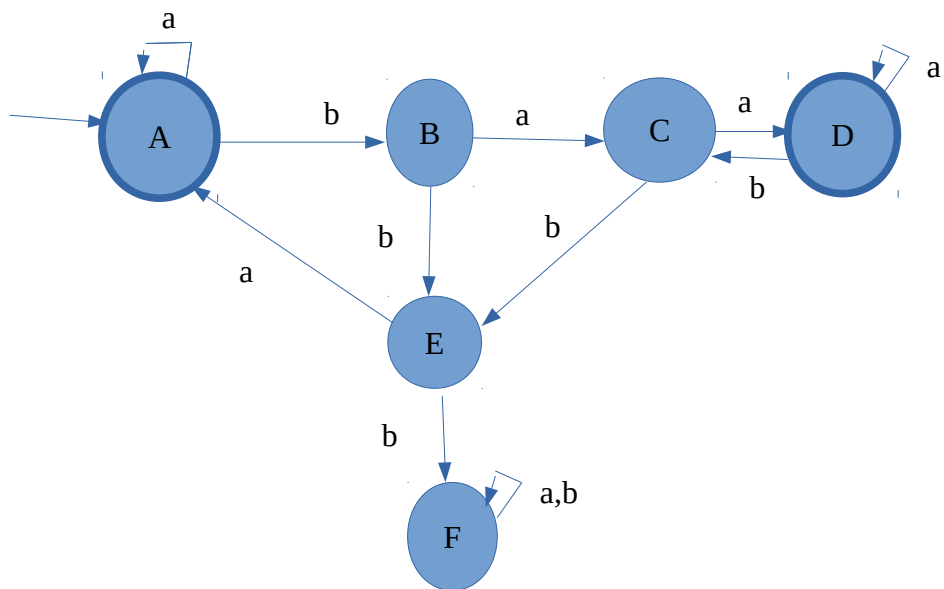
$\delta(\langle 2,3 \rangle, a) = \langle 1,2,3 \rangle$
 $\delta(\langle 2,3 \rangle, b) = \langle 3 \rangle$

$\delta(\langle 3 \rangle, a) = \langle 1,3 \rangle$
 $\delta(\langle 3 \rangle, b) = \langle \rangle$

$\delta(\langle 1,2,3 \rangle, a) = \langle 1,2,3 \rangle$
 $\delta(\langle 1,2,3 \rangle, b) = \langle 2,3 \rangle$

$\delta(\langle \rangle, a) = \langle \rangle$
 $\delta(\langle \rangle, b) = \langle \rangle$





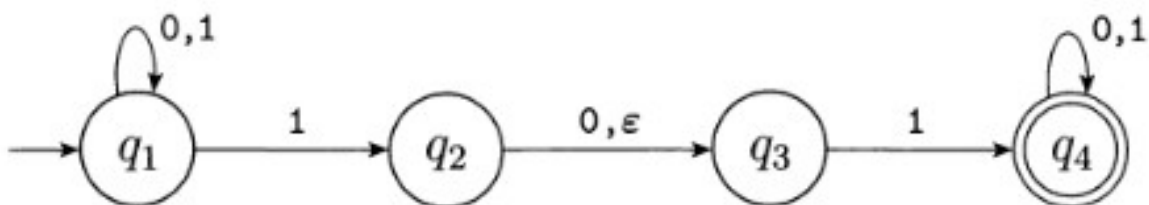
$D = (\{A, B, C, D, E, F\}, \{a, b\}, \delta_d, A, \{A, D\})$

δ_d	a	b
A	A	B
B	C	E
C	D	E
D	D	C
E	A	F
F	F	F

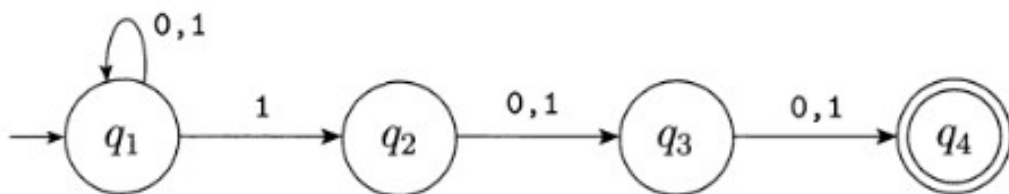
Exercício

Dado os diagramas abaixo, de a descrição formal dos AFNs correspondentes e transforme em um AFD, dando também a descrição formal.

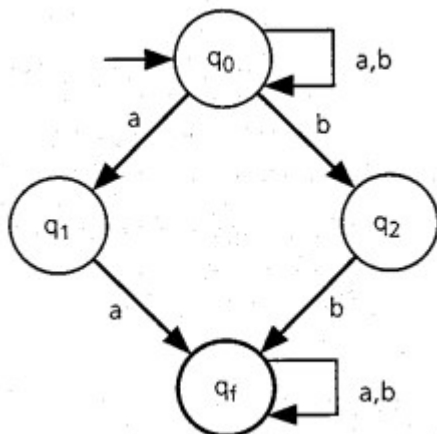
(1)



(2)



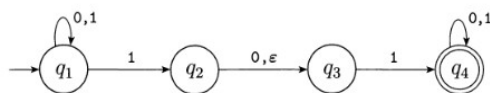
(3)



Resolvendo (1)

Tabela de conjuntos encontrados

Conjunto	Utilizado	Tipo
{q1}	x	q0
{q1,q2,q3}	x	
{q1,q3}	x	
{q1,q2,q3,q4}	x	F
{q1,q3,q4}	x	F
{q1,q4}	x	F



$$E(\{q1\}) = \{q1\} (+)$$

$$E(\delta(\{q1\},0)) = E(\{q1\}) = \{q1\}$$

$$E(\delta(\{q1\},1)) = E(\{q1,q2\}) = \{q1,q2,q3\} (+)$$

$$E(\delta(\{q1,q2,q3\},0)) = E(\{q1,q3\}) = \{q1,q3\} (+)$$

$$E(\delta(\{q1,q2,q3\},1)) = E(\{q1,q2,q4\}) = \{q1,q2,q3,q4\} (+)$$

$$E(\delta(\{q1,q3\},0)) = E(\{q1\}) = \{q1\}$$

$$E(\delta(\{q1,q3\},1)) = E(\{q1,q2,q4\}) = \{q1,q2,q3,q4\}$$

$$E(\delta(\{q1,q2,q3,q4\},0)) = E(\{q1,q3,q4\}) = \{q1,q3,q4\} (+)$$

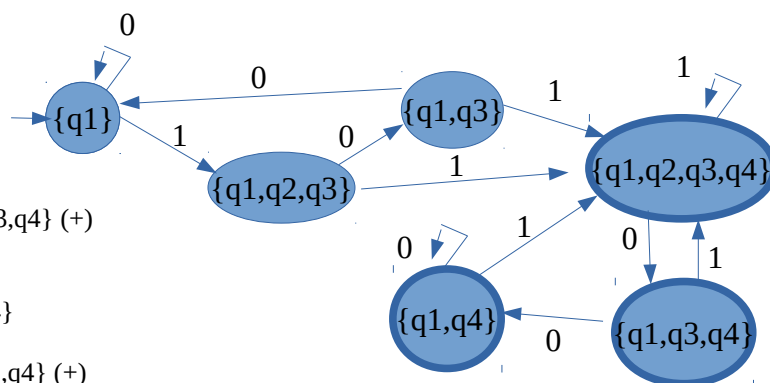
$$E(\delta(\{q1,q2,q3,q4\},1)) = E(\{q1,q2,q4\}) = \{q1,q2,q3,q4\}$$

$$E(\delta(\{q1,q3,q4\},0)) = E(\{q1,q4\}) = \{q1,q4\} (+)$$

$$E(\delta(\{q1,q3,q4\},1)) = E(\{q1,q2,q4\}) = \{q1,q2,q3,q4\}$$

$$E(\delta(\{q1,q4\},0)) = E(\{q1,q4\}) = \{q1,q4\}$$

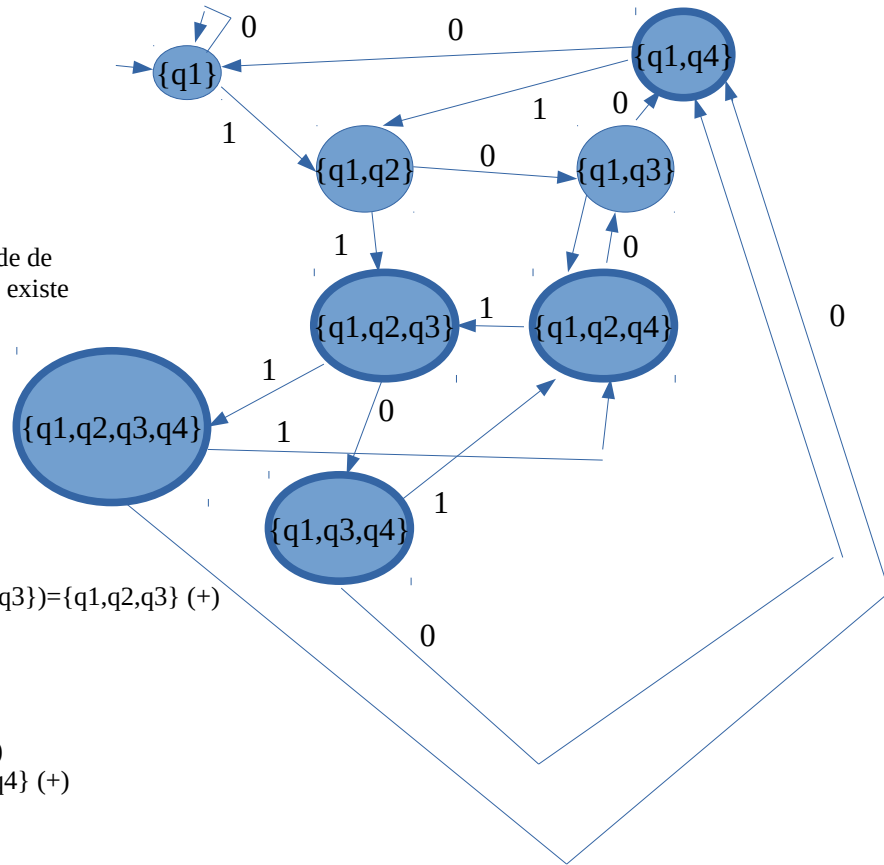
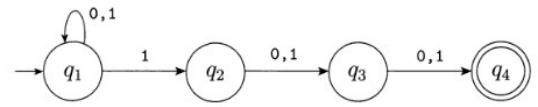
$$E(\delta(\{q1,q4\},1)) = E(\{q1,q2,q4\}) = \{q1,q2,q3,q4\}$$



Resolvendo (2)

Tabela de conjuntos encontrados

Conjunto	Utilizado	Tipo
{q1}	x	q0
{q1,q2}	x	
{q1,q3}	x	
{q1,q2,q3}	x	
{q1,q4}	x	F
{q1,q2,q4}	x	F
{q1,q3,q4}	x	F
{q1,q2,q3,q4}	x	F



Quando não temos **transições-ε**, não há necessidade de utilizar a função **E()**, porque $E(q) = \{q\}$ quando não existe $\delta(q, \epsilon)$.

Mas, para mostrar que é verdade, vamos utilizar.

$$E(\delta(q_1)) = \{q_1\} (+)$$

$$E(\delta(\{q_1\}, 0)) = E(\{q_1\}) = \{q_1\}$$

$$E(\delta(\{q_1\}, 1)) = E(\{q_1, q_2\}) = \{q_1, q_2\} (+)$$

$$E(\delta(\{q_1, q_2\}, 0)) = E(\{q_1, q_3\}) = \{q_1, q_3\} (+)$$

$$E(\delta(\{q_1, q_2\}, 1)) = E(\delta(q_1, 1) \cup \delta(q_2, 1)) = E(\{q_1, q_2, q_3\}) = \{q_1, q_2, q_3\} (+)$$

$$E(\delta(\{q_1, q_3\}, 0)) = E(\{q_1, q_4\}) = \{q_1, q_4\} (+)$$

$$E(\delta(\{q_1, q_3\}, 1)) = E(\{q_1, q_2, q_4\}) = \{q_1, q_2, q_4\} (+)$$

$$E(\delta(\{q_1, q_2, q_3\}, 0)) = E(\{q_1, q_3, q_4\}) = \{q_1, q_3, q_4\} (+)$$

$$E(\delta(\{q_1, q_2, q_3\}, 1)) = E(\{q_1, q_2, q_3, q_4\}) = \{q_1, q_2, q_3, q_4\} (+)$$

$$E(\delta(\{q_1, q_4\}, 0)) = E(\{q_1\}) = \{q_1\}$$

$$E(\delta(\{q_1, q_4\}, 1)) = E(\{q_1, q_2\}) = \{q_1, q_2\}$$

$$E(\delta(\{q_1, q_2, q_4\}, 0)) = E(\{q_1, q_3\}) = \{q_1, q_3\}$$

$$E(\delta(\{q_1, q_2, q_4\}, 1)) = E(\{q_1, q_2, q_3\}) = \{q_1, q_2, q_3\}$$

$$E(\delta(\{q_1, q_3, q_4\}, 0)) = E(\{q_1, q_4\}) = \{q_1, q_4\}$$

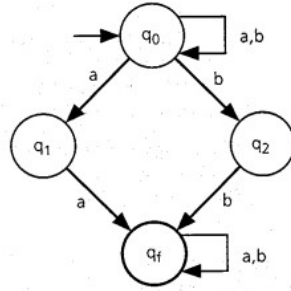
$$E(\delta(\{q_1, q_3, q_4\}, 1)) = E(\{q_1, q_2, q_4\}) = \{q_1, q_2, q_4\}$$

$$E(\delta(\{q_1, q_2, q_3, q_4\}, 0)) = E(\{q_1, q_3, q_4\}) = \{q_1, q_3, q_4\}$$

$$E(\delta(\{q_1, q_2, q_3, q_4\}, 1)) = E(\{q_1, q_2, q_3, q_4\}) = \{q_1, q_2, q_3, q_4\}$$

Resolvendo (3)

Conjunto	Utilizado	Tipo
{q0}	x	q0
{q0,q1}	x	
{q0,q2}	x	
{q0,q1,qf}	x	F
{q0,q2,qf}	x	F



(+) {q0}

$\delta(\{q0\},a)=\{q0,q1\}$ (+)

$\delta(\{q0\},b)=\{q0,q2\}$ (+)

$\delta(\{q0,q1\},a)=\{q0,q1,qf\}$ (+)

$\delta(\{q0,q1\},b)=\{q0,q2,qf\}$ (+)

$\delta(\{q0,q2\},a)=\{q0,q1\}$

$\delta(\{q0,q2\},b)=\{q0,q2,qf\}$

$\delta(\{q0,q1,qf\},a)=\{q0,q1,qf\}$

$\delta(\{q0,q1,qf\},b)=\{q0,q2,qf\}$

$\delta(\{q0,q2,qf\},a)=\{q0,q1\}$

$\delta(\{q0,q2,qf\},b)=\{q0,q2,qf\}$

