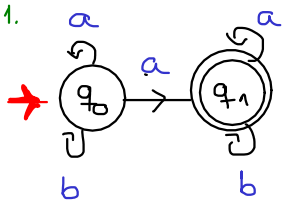
AUTÔMATOS FINITOS DETERMINÍSTICOS x NÃO DETERMINÍSTICOS

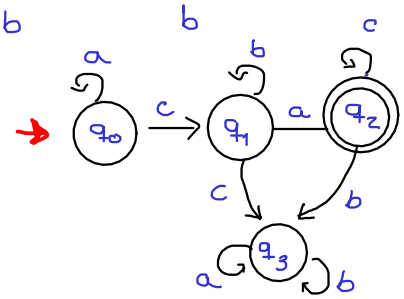
Ex 1.



$L(M) = (a \cup b)^* a\,(a \cup b)^*$ → AFND (autômato finito não determinístico)

$\delta'(q_0, a) = \{q_0, q_1\}$; $\delta'(q_0, b) = \{q_0\}$ | $\delta'(q_1, b) = \{q_1\}$ |
$\delta'(q_1, a) = \{q_1\}$ |

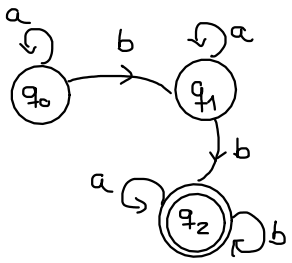
Ex 2:



$L(M) = a^* c b^* a c^*$ → AFND

$\delta'(q_0, a) = \{q_0\}$ | $\delta'(q_1, a) = \{q_2\}$ | $\delta'(q_2, b) = \{q_3\}$
$\delta'(q_0, b) = \{\} = \emptyset$ | $\delta'(q_1, b) = \{q_1\}$ | $\delta'(q_2, c) = \{q_2\}$
$\delta'(q_0, c) = \{q_1\}$ | $\delta'(q_1, c) = \{q_3\}$ | $\delta'(q_3, a) = \{q_3\}$
$\delta'(q_2, a) = \{\}$ | $\delta'(q_3, b) = \{q_3\}$
$\delta'(q_3, c) = \emptyset = \{\}$

Ex 3:



$L(M) = a^* b a^* b (a \cup b)^*$ → AFD

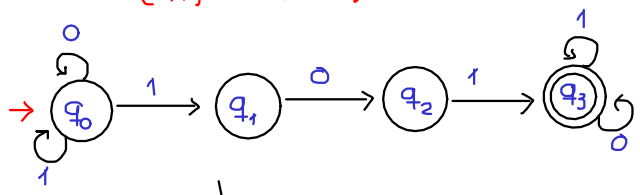
$\delta(q_0, a) = q_0$ $\delta(q_1, a) = q_1$ $\delta(q_2, a) = q_2$
$\delta(q_0, b) = q_1$ $\delta(q_1, b) = q_2$ $\delta(q_2, b) = q_2$

Exemplos de AFD e AFND

AFND x AFD

$\{0,1\}^*1101\{0,1\}^*$

M' AFND



$M' = \langle \{q_0,q_1,q_2,q_3\}, \{0,1\}, \delta, q_0, \{q_3\} \rangle$

$\delta'(q_0,0)=\{q_0\}$ $\delta'(q_1,0)=q_2$

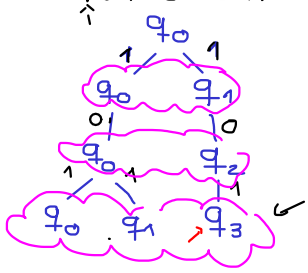
$\delta'(q_0,1)=\{q_0,q_1\}$ $\delta'(q_1,1)=\{\}=\emptyset$

$L(M) = (0\cup1)^*101(0\cup1)^*$ $\delta'(q_2,0)=\{\}$

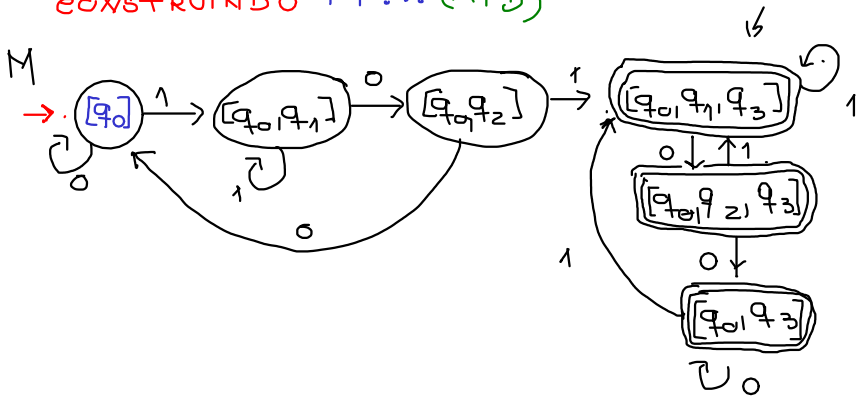
$101 \in L(M)$? $\delta'(q_2,1)=\{q_3\}$

$\delta'(q_3,0)=\{q_3\}$

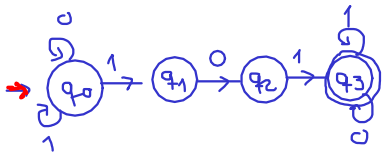
$\delta'(q_3,1)=\{q_3\}$



CONSTRUINDO M ... (AFD)



M'



$\delta([q_0],0) = \delta'(q_0,0) = \{q_0\} = [q_0]$

$\delta([q_0],1) = \delta'(q_0,1) = \{q_0,q_1\} = [q_0,q_1]$

$\delta([q_0,q_1],0) = \delta'(q_0,0) \cup \delta'(q_1,0) = \{q_0\} \cup \{q_2\} = \{q_0,q_2\} = [q_0,q_2]$

$\delta([q_0,q_1],1) = \delta'(q_0,1) \cup \delta'(q_1,1) = \{q_0,q_1\} \cup \{\} = \{q_0,q_1\} = [q_0,q_1]$

$\delta[q_0,q_2],0) = [q_0]$!! $\delta([q_0,q_2],1) = [q_0,q_1,q_3]$

$\delta([q_0,q_1,q_3],0) = [q_0,q_2,q_3]$

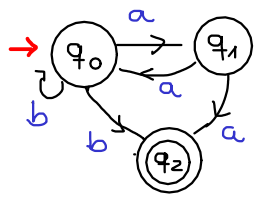
$\delta([q_0,q_1,q_3],1) = [q_0,q_1,q_3]$

$\delta([q_0,q_2,q_3],0) = [q_0,q_3]$

$\delta([q_0,q_2,q_3],1) = [q_0,q_1,q_3]$

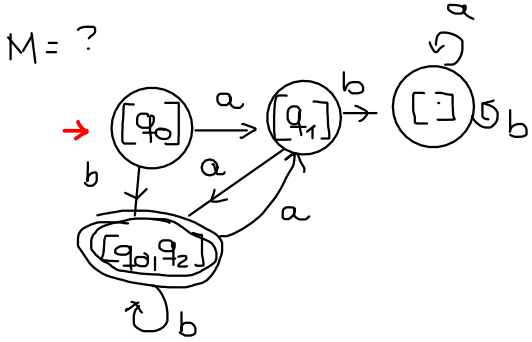
$\delta([q_0,q_3],0) = [q_0,q_3]$

$\delta([q_0,q_3],1) = [q_0,q_1,q_3]$

Se $M' =$ 

, daí, encontre M, AFD, tal que $L(M) = L(M')$

M = ?



$\delta([q_0],a) = [q_1]$

$\delta([q_0],b) = [q_0,q_2]$

$\delta([q_1],a) = [q_0,q_2]$

$\delta([q_1],b) = []$

$\delta([q_0,q_2],a) = [q_1]$

$\delta([q_0,q_2],b) = [q_0,q_2]$

$\delta([],a) = \delta([],b) = []$

Gramáticas × AFD/AFND Regulares

Ex1: Passando da gramática para o autômato.

$G_1 = \langle \{S, A, B\}, \{a, b\}, P, S \rangle$ $\quad L(M) = ?$

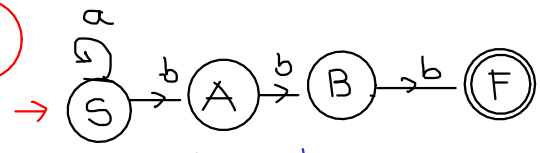
P: 1 - $S \to aS$ $\quad$ 3 - $A \to bB$

2 - $S \to bA$ $\quad$ 4 - $B \to b$

$S \overset{1}{\Rightarrow} aS \overset{1}{\Rightarrow} aaS \overset{1}{\Rightarrow} aaaS \overset{2}{\Rightarrow} aaabA \overset{3}{\Rightarrow} aaabbB \overset{4}{\Rightarrow} aaabbb$

$\equiv$

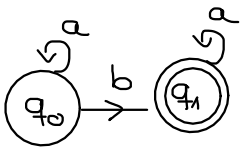
M_1



$L(M) = a^* bbb = L(G)$

Passando do autômato para a Gramática.

M_1'



$L(M) = a^* ba^*$

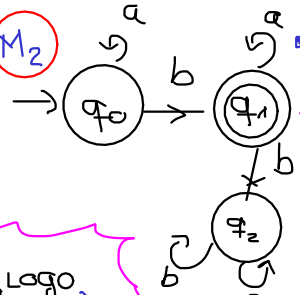
$G = \langle \{q_0, q_1\}, \{a, b\}, P, q_0 \rangle$

P: 1 - $q_0 \to aq_0$ $\quad$ 3 - $q_1 \to aq_1$

2 - $q_0 \to bq_1$ $\quad$ 4 - $q_1 \to a$

5 - $q_0 \to b$

M_2



Note que o Autômato finito M_2 é determinístico e é equivalente a M_1'

$ba \in L(M)$, logo $ba \in L(G)$? SIM

$q_0 \overset{2}{\Rightarrow} bq_1 \overset{4}{\Rightarrow} ba$