ATIVIDADE EXTRA-CLASSE

4 – Conversão AFε → AFND
Data de Entrega: (até 08/05/2016)
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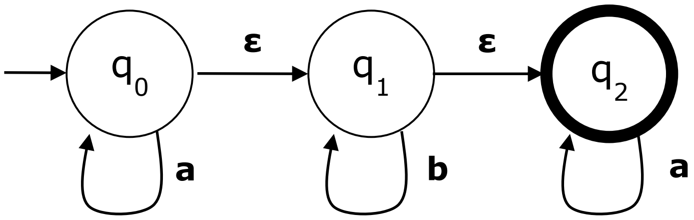
Título E-mail: [CC] LFA 4
Grupo: ≤ 4 alunos

Exemplo: Dado o Afε $M=(\{a,b\}, \{q_0,q_1,q_2\}, \delta, \{q_0\}, F)$



- Existe um AFND $M'=(\{a,b\}, \{q_0,q_1,q_2\}, \delta', \{q_0\}, F')$ equivalente.

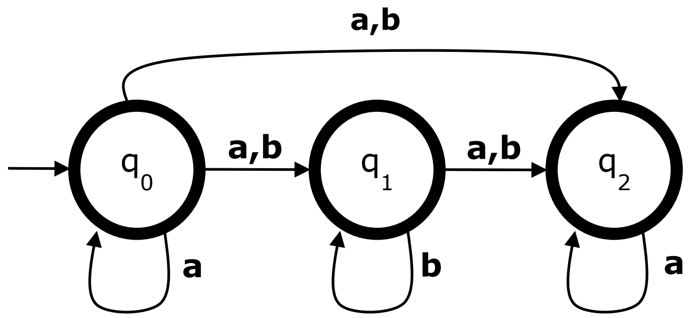
- F' é retirado da função Fecho Vazio ($F\varepsilon$).
  - $F'=\{q_0, q_1, q_2\}$, pois:
  - $F\varepsilon(q_0) = \{q_0\} \cup \delta(q_0,\varepsilon) \cup \delta(\delta(q_0,\varepsilon),\varepsilon) =$
    $= \{q_0\} \cup \{q_1\} \cup \{q_2\}$
    $= \mathbf{\{q_0, q_1, q_2\}}$
  - $F\varepsilon(q_1) = \{q_1\} \cup \delta(q_1,\varepsilon) =$
    $= \{q_1\} \cup \{q_2\}$
    $= \mathbf{\{q_1, q_2\}}$
  - $F\varepsilon(q_2) = \mathbf{\{q_2\}}$
  - Como todos tem $\{q_2\}$, todos os estados são finais no AFND.

- δ' é retirado da função Programa Estendida ($\underline{\delta}$).
  - $\delta'(q_0,\varepsilon) = \underline{\delta}(q_0,\varepsilon) \quad = F\varepsilon(q_0) = \{q_0, q_1, q_2\}$
  - $\delta'(q_0,a) = \underline{\delta}(q_0,a) \quad = F\varepsilon(\{r \mid r \in \delta(s, a) \text{ e } s \in \underline{\delta}(q_0,\varepsilon)\})$
    $= F\varepsilon(\{r \mid r \in \delta(s, a) \text{ e } s \in \{q_0, q_1, q_2\}\})$
    $= F\varepsilon(\{\delta(q_0, a) \cup \delta(q_1, a) \cup \delta(q_2, a)\})$
    $= F\varepsilon(\{q_0 \cup \varnothing \cup q_2\})$
    $= F\varepsilon(\{q_0, q_2\})$
    $= F\varepsilon(q_0) \cup F\varepsilon(q_2\}) = \mathbf{\{q_0, q_1, q_2\}}$
  - $\delta'(q_0,b) = \underline{\delta}(q_0,b) \quad = F\varepsilon(\{r \mid r \in \delta(s, b) \text{ e } s \in \underline{\delta}(q_0,\varepsilon)\})$
    $= F\varepsilon(\{r \mid r \in \delta(s, b) \text{ e } s \in \{q_0, q_1, q_2\}\})$
    $= F\varepsilon(\{\delta(q_0, b) \cup \delta(q_1, b) \cup \delta(q_2, b)\})$
    $= F\varepsilon(\{\varnothing \cup q_1 \cup \varnothing\})$
    $= F\varepsilon(\{q_1\}) = \mathbf{\{q_1, q_2\}}$

- $\delta'(q_1,\varepsilon) = \underline{\delta}(q_1,\varepsilon) \quad = F\varepsilon(q_1) = \{q_1, q_2\}$
- $\delta'(q_1,a) = \underline{\delta}(q_1,a) \quad = F\varepsilon(\{r \mid r \in \delta(s, a) \text{ e } s \in \underline{\delta}(q_1,\varepsilon)\})$
  $= F\varepsilon(\{r \mid r \in \delta(s, a) \text{ e } s \in \{q_1, q_2\}\})$
  $= F\varepsilon(\{\delta(q_1, a) \cup \delta(q_2, a)\})$
  $= F\varepsilon(\{\varnothing \cup q_2\})$
  $= F\varepsilon(\{q_2\}) = \mathbf{\{q_2\}}$
- $\delta'(q_1,b) = \underline{\delta}(q_1,b) \quad = F\varepsilon(\{r \mid r \in \delta(s, b) \text{ e } s \in \underline{\delta}(q_1,\varepsilon)\})$
  $= F\varepsilon(\{r \mid r \in \delta(s, b) \text{ e } s \in \{q_1, q_2\}\}) =$
  $= F\varepsilon(\{\delta(q_1, b) \cup \delta(q_2, b)\})$
  $= F\varepsilon(\{q_1 \cup \varnothing\})$
  $= F\varepsilon(\{q_1\}) = \mathbf{\{q_1, q_2\}}$

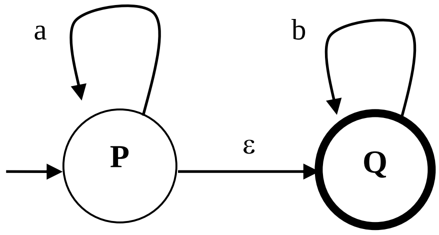
- $\delta'(q_2,\varepsilon) = \underline{\delta}(q_2,\varepsilon) \quad = F\varepsilon(q_2) = \{q_2\}$
- $\delta'(q_2,a) = \underline{\delta}(q_2,a) \quad = F\varepsilon(\{r \mid r \in \delta(s, a) \text{ e } s \in \underline{\delta}(q_2,\varepsilon)\})$
  $= F\varepsilon(\{r \mid r \in \delta(s, a) \text{ e } s \in \{q_2\}\}) =$
  $= F\varepsilon(\{\delta(q_2, a)\})$
  $= F\varepsilon(\{q_2\}) = \mathbf{\{q_2\}}$
- $\delta'(q_2,b) = \underline{\delta}(q_2,b) \quad = F\varepsilon(\{r \mid r \in \delta(s, b) \text{ e } s \in \underline{\delta}(q_2,\varepsilon)\}) =$
  $= F\varepsilon(\{r \mid r \in \delta(s, b) \text{ e } s \in \{q_2\}\}) =$
  $= F\varepsilon(\{\delta(q_2, b)\})$
  $= F\varepsilon(\{\varnothing\}) = \varnothing$

- δ' equivalente:

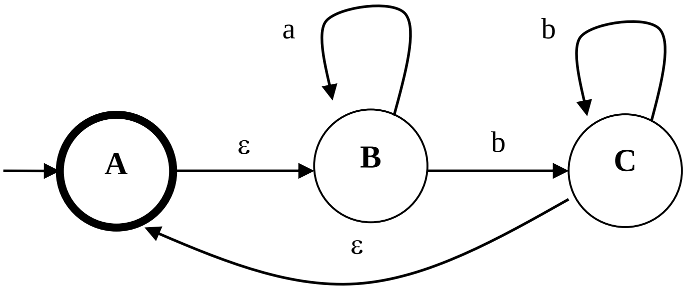


1-) Converta os AFε's abaixo para seus equivalentes AFND's.

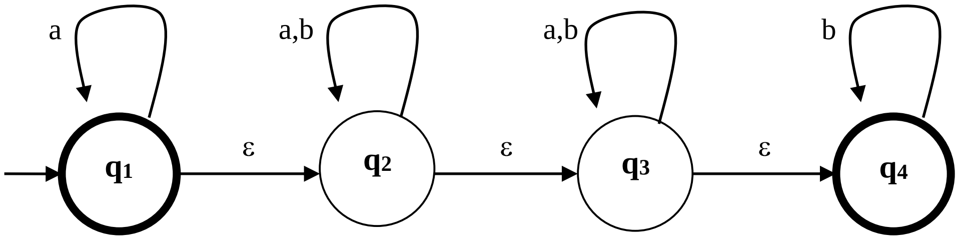
a)



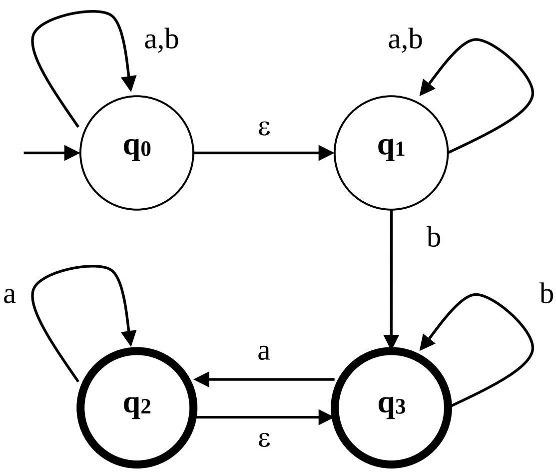
b)



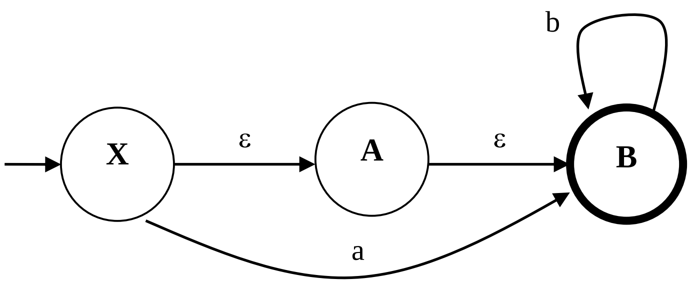
c)



d)



e)



2-) Converta o AFε abaixo para seu AFD mínimo equivalente, se possível.