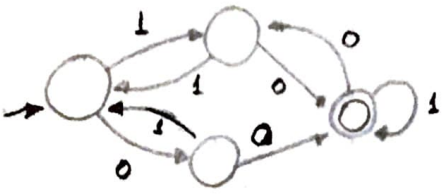
6



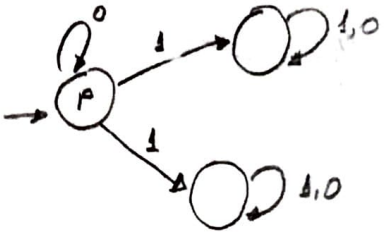
→○ is the initial state

◎ is the final state

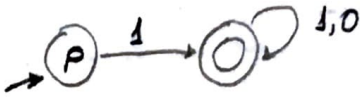
$\Sigma = \{1, 0\}$

DFA_1

If one of these 3 things happens ⇒ NFA



NFA_1

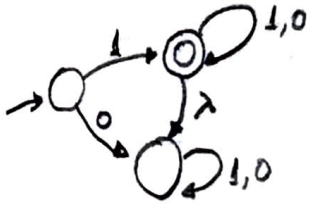


NFA_2

NFA_1 : more than one transition from p with 1

NFA_2 : no transition defined from p with 0

NFA_3 : λ transition



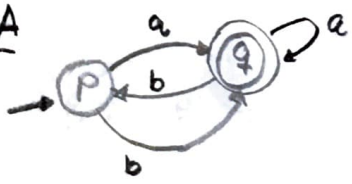
NFA_3

7

$\Sigma = \{a, b\}$ $Q = \{p, q\}$ $q_0 = p$

$F = \{q\}$

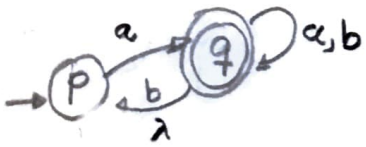
DFA



$\delta(p, a) = q$
$\delta(p, b) = q$
$\delta(q, a) = q$
$\delta(q, b) = p$

Transition function

NFA



$\delta(p, b) = \emptyset$
$\delta(q, b) = \{p, q\}$
$\delta(q, \lambda) = \{p\}$

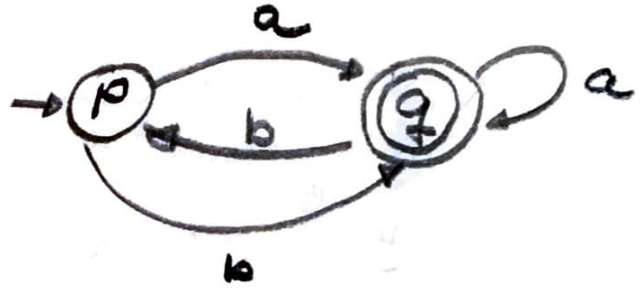
Transition function

$P(Q) = \{\{p\}, \{q\}, \{p, q\}, \emptyset\}$

8

$\Sigma = \{a, b\}$

DFA A



$t = aababa$

$(p, \underbrace{aababa}_{t})$ ← INITIAL CONFIGURATION

$(p, aababa) \rightarrow (q, ababa) \rightarrow (q, baba) \rightarrow (p, aba) \rightarrow$

$\rightarrow (q, ba) \rightarrow (p, a) \rightarrow (q, \lambda)$

movement

$\delta(q, b) = p$

FINAL STATE

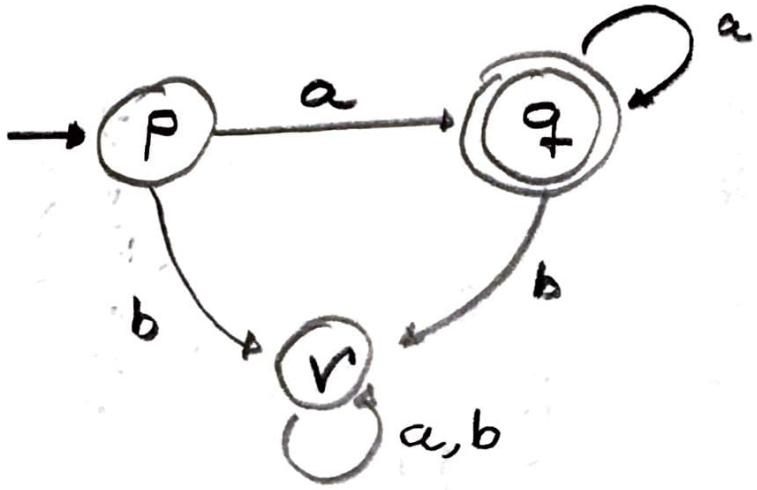
The string t has been read

$(p, t) \cdots\rightarrow (q, \lambda)$

several movements

$t \in L$	$t \in L(A)$
$X = ab$	$X \notin L(A)$

9



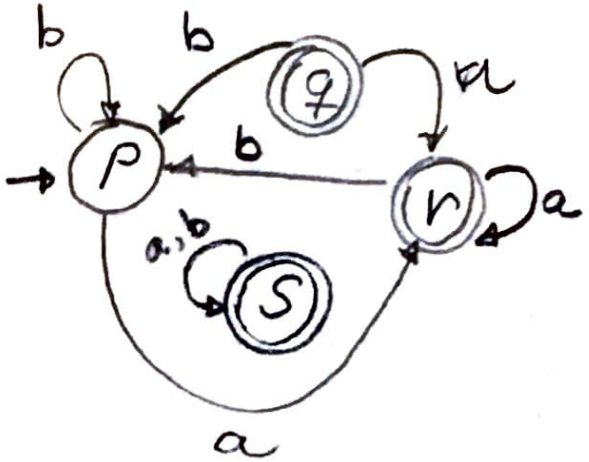
$$\delta'(p, baa) = \delta'(\underbrace{\delta(p,b)}_{r}, aa) = \delta'(r, aa) =$$

$$= \delta'(\underbrace{\delta(r,a)}_{r}, a) = \delta'(r, a) = \delta'(\underbrace{\delta(r,a)}_{r}, \lambda) =$$

$$= \delta'(r, \lambda) = r \implies \delta'(p, baa) = r$$

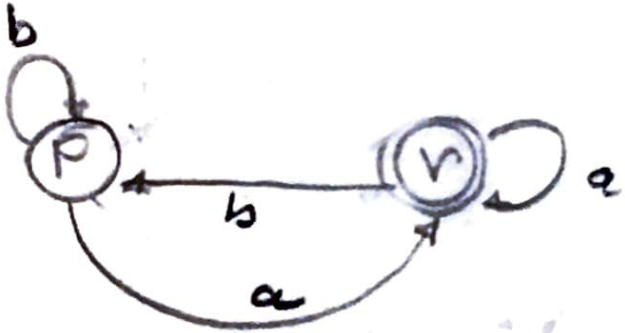
10

DFA$_1$



eliminate Non-reacheable state

DFA$_2$



is not connected

S is not reacheable from p

q is not reacheable from p

$$L(DFA_1) = L(DFA_2)$$

11

I

① Reflexive

$$pEp$$

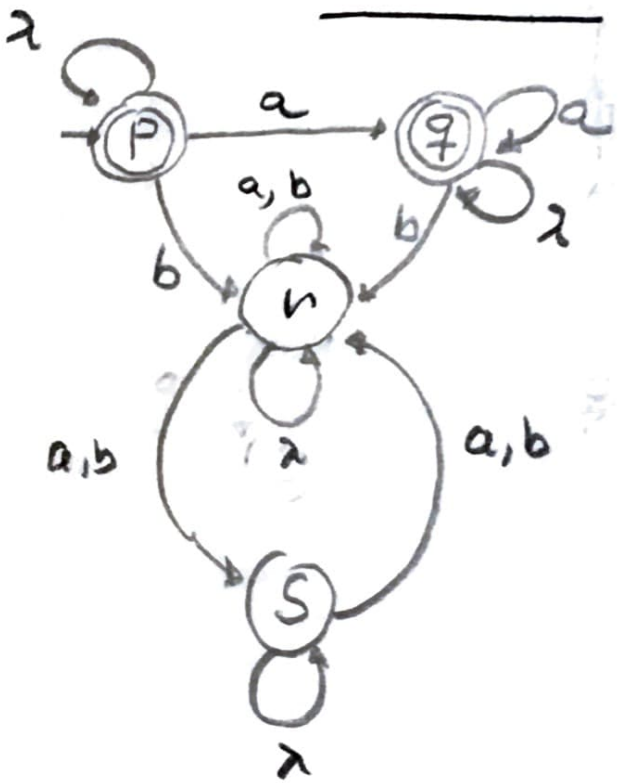
② Symetrical

$$pEq \Rightarrow qEp$$

③ Transitive

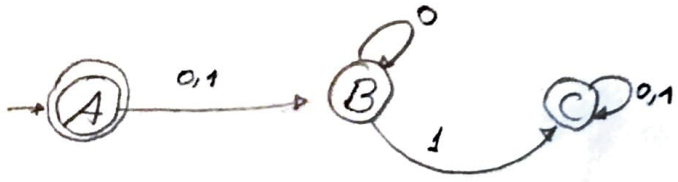
$$pEq \wedge qEr \Rightarrow pEr$$

II



12

$Q = \{A, B, C\}$
$F = \{A\}$
$C_1 = \{A\} \leftarrow E_0$
$C_2 = \{B, C\} \leftarrow E_0$



$\forall p, q \in Q - F \quad p E_0 q \Rightarrow BE_0C$

$C_1 = \{A\} \leftarrow E_1$
$C_2 = \{B, C\} \leftarrow E_1$

$\left.\begin{array}{l} \delta(B,0) = B \in C_2 \\ \delta(C,0) = C \in C_2 \\ \delta(B,1) = C \in C_2 \\ \delta(C,1) = C \in C_2 \end{array}\right\} \Rightarrow BE_1C$

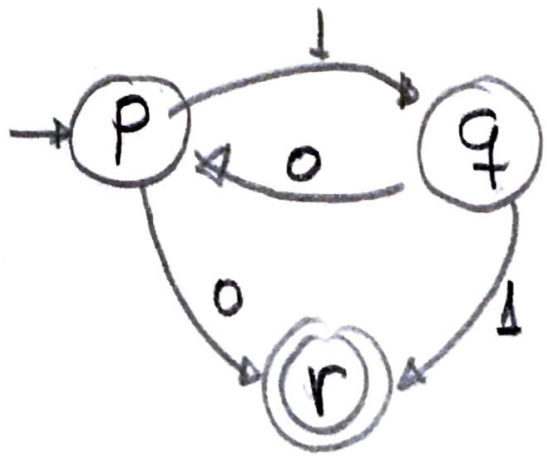
$\left.\begin{array}{l} \delta(B,0) = B \in C_2 \\ \delta(C,0) = C \in C_2 \\ \delta(B,1) = C \in C_2 \\ \delta(C,1) = C \in C_2 \end{array}\right\} \Rightarrow BE_2C$

$BE_1C \wedge BE_2C \Rightarrow BEC$

$Q = \{A, B, C\}$
$F = \{A, C\}$
$C_1 = \{A, C\} \leftarrow E_0$
$C_2 = \{B\} \leftarrow E_0$

$\left.\begin{array}{l} \delta(A,0) = B \in C_2 \\ \delta(A,1) = B \in C_2 \end{array}\right\}$
$\left.\begin{array}{l} \delta(C,0) = C \in C_1 \\ \delta(C,1) = C \in C_1 \end{array}\right\} \not\Rightarrow AE_1C$

13 $Q = \{p, q, r\}$



$C_1 = \{p, q\} \leftarrow E_0$

$C_2 = \{r\} \leftarrow E_0$

$\left.\begin{array}{l} \delta(p,0) = r \in C_2 \\ \delta(q,0) = p \in C_1 \end{array}\right\} \Rightarrow C_2 \neq C_1 \Rightarrow$

NOT $p E_1 q$

$Q/E_0 = \{C_1, C_2\}$ | p and q separate

$Q/E_1 = \{C_1, C_2, C_3\}$

$Q/E = \{C_1, C_2\ C_3\}$

So

$C_1 = \{p\}$ $C_2 = \{q\}$ $C_3 = \{r\}$

pE_1p qE_1q rE_1r

$c(Q) = 3 - 2$