

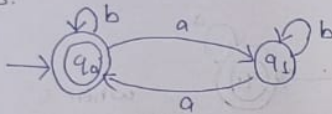
22-02-2024,  
Thursday.

# [Assignment-1]

## THEORY OF COMPUTATION (CSA132L)

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- ① Design a DFA using simulator to accept even number of 0's.



States:  $q_0, q_1$

Initial state:  $q_0$

Final state:  $q_0$

Input symbols:  $\{a, b\}$

Automata =  $\{ (q_0, q_1), \{a, b\}, \delta, q_0, q_0 \}$

where  $\delta$ ,

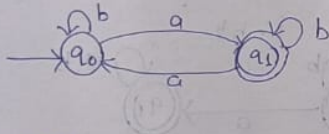
$\delta(q_0, a) = q_1$

$\delta(q_0, b) = q_0$

$\delta(q_1, a) = q_0$

$\delta(q_1, b) = q_1$

- ② Design DFA using simulator to accept odd number of a's.



States:  $q_0, q_1$

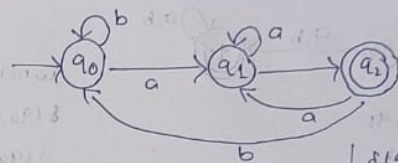
Initial state:  $q_0$

Final state:  $q_1$

Input symbol:  $\{a, b\}$

Automata =  $\{ \{q_0, q_1\}, \{a, b\}, \delta, q_0, q_1 \}$

- ③ Design a DFA using simulator to accept string the end with ab over set  $\{a, b\}$   $w = aabab$ .



States:  $q_0, q_1, q_2$

Initial state:  $q_0$

Final state:  $q_2$

Input symbols =  $\{a, b\}$

Automata:  $\{ (q_0, q_1, q_2), \{a, b\}, \delta, q_0, q_2 \}$  string accepted

string = aabab

$\delta(q_0, aabab) = \delta(q_1, abab)$

$= \delta(q_1, abab)$

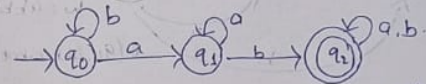
$= \delta(q_2, bab)$

$= \delta(q_1, ab)$

$= q_2$

$= \text{Final state}$

- ④ Design DFA using simulator for accept the string having ab as sub string over the set  $\{a, b\}$ .



States:  $q_0, q_1, q_2$

Initial state:  $q_0$

Final state:  $q_2$

Input symbols =  $\{a, b\}$

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

where  $\delta$ ,

$\delta(q_0, a) = q_0$

$\delta(q_0, b) = q_1$

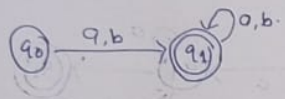
$\delta(q_1, a) = q_1$

$\delta(q_1, b) = q_2$

$\delta(q_2, a) = q_0$

$\delta(q_2, b) = q_1$

- ⑤ Design DFA simulator to accept the string start with a or b over the set  $\{a, b\}$ .



$$Q = \{q_0, q_1\}$$

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

$$q_0 = q_0$$

$$F = \{q_1\}$$

$$\text{Automata} = \{ \{q_0, q_1\}, \{a, b\}, \delta, q_0, q_1 \}$$

where  $\delta$ :

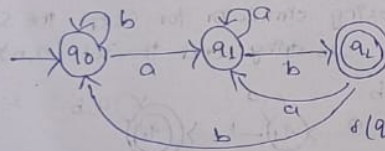
$$\delta(q_0, a) = q_1$$

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

$$\delta(q_1, a) = q_1$$

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

- ⑥ Design a DFA using simulator to accept the string end with ab over the set  $\{a, b\}$   $w = abbaabab$ .



$$\text{states} : q_0, q_1, q_2$$

$$\text{Initial state} : q_0$$

$$\text{Final state} : q_2$$

$$\text{Input symbols} : \{a, b\}$$

$$\text{Automata} = \{ \{q_0, q_1, q_2\}, \{a, b\}, \delta, q_0, q_2 \}$$

$$\delta(q_0, abbaabab) = \delta(q_1, bbaabab)$$

$$= \delta(q_1, bbaabab)$$

$$= \delta(q_0, aabab)$$

$$= \delta(q_1, abab)$$

$$= \delta(q_1, bab)$$

$$= \delta(q_1, ab)$$

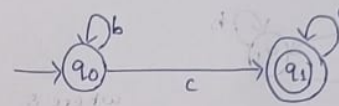
$$= \delta(q_2, b)$$

$$= q_2$$

$$\text{Final state}$$

string accepted.

- ⑦ Design DFA simulator to accept the input string "bc", "c", & "bca".



$$Q = \{q_0, q_1\}$$

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

$$q_0 = q_0$$

$$F = \{q_1\}$$

$$\text{Automata} = \{ \{q_0, q_1\}, \{a, b\}, \delta, q_0, q_1 \}$$

where  $\delta$ :

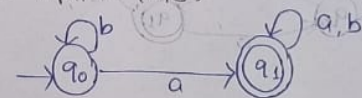
$$\delta(q_0, a) = q_1$$

$$\delta(q_0, b) = q_0$$

$$\delta(q_1, a) = q_1$$

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

- ⑧ Design a DFA simulator to accept any number of a's where input  $\Sigma = \{a, b\}$ .



$$Q = \{q_0, q_1\}$$

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

$$q_0 = q_0$$

$$F = \{q_1\}$$

$$\text{Automata} = \{ \{q_0, q_1\}, \{a, b\}, \delta, q_0, q_1 \}$$

where  $\delta$ :

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

$$\delta(q_0, b) = q_0$$

$$\delta(q_1, a) = q_1$$

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