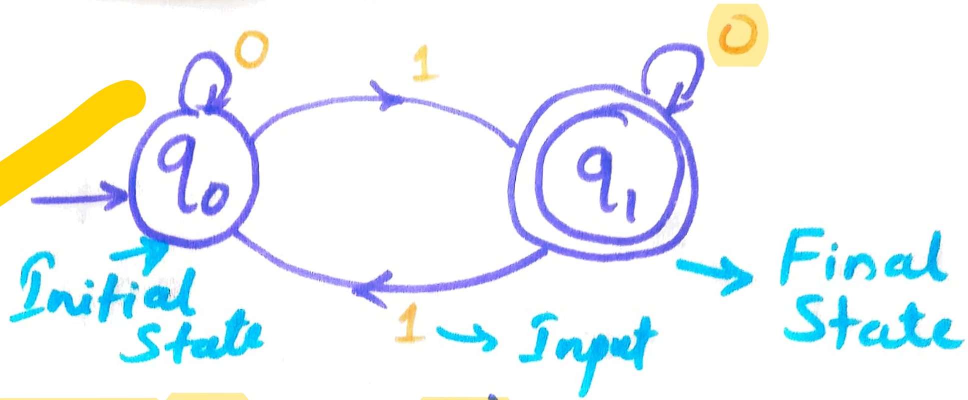
DFA :-



$M = (Q, \Sigma, \delta, q_0, F)$

where, Q = Set of all finite States

Σ = I/p alphabet / I/p symbols

Next State Function → $\delta = Q \times \Sigma \rightarrow Q$ is the transition function

q_0 = Initial State $(q_0 \in Q)$

F = Set of all finial States $(F \subseteq Q)$

Ex :

$Q = \{q_0, q_1\}$

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

$F = \{q_1\}$

δ :- Transition funⁿ

$Q \times \Sigma = Q$

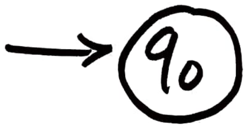
$\delta(q_0, 0) = q_0$

$\delta(q_0, 1) = q_1$

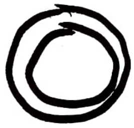
$\delta(q_1, 0) = q_1$

$\delta(q_1, 1) = q_0$

FA / DFA

1> 

Only one Initial State

2> 

No. of final States in DFA can be 0 (or) 1 (or) more

3> DFA is complete System which responds for both ~~..~~ valid as well as invalid i/p strings.

4> No. of transitions at a State = No. of i/p symbols i.e. $|\Sigma|$

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

5> Total No. of Transition function in DFA $= |\Sigma| \times |Q|$

$\{0, 1\} \times \{q_0, q_1\} = \underline{4}$

6> DFA moves ~~to~~ exactly to one State after taking input symbol from Σ.

* Acceptance By Finite Automata :-

If there exists a transition path which starts at initial state and ends in any one of the final states then string w is accepted by FA.

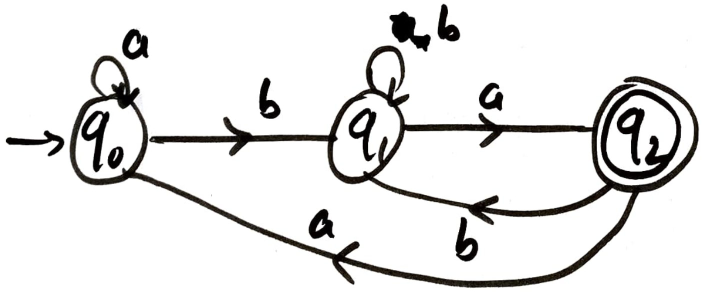
$$L(FA) = \{ w \in \Sigma^* \mid \delta(q_0, w) = \text{Final State} \}$$

The set of all the strings which are accepted by FA is called as language of FA.

Ex :- $\Sigma = \{a, b\}$

$\Sigma^* = \{ \epsilon, a, b, ab, ba \ldots \}$

$L(FA) = \{ w \in \Sigma^* \mid w = x\underline{ba} \}$; $x \in \Sigma^* \rightarrow$ RL



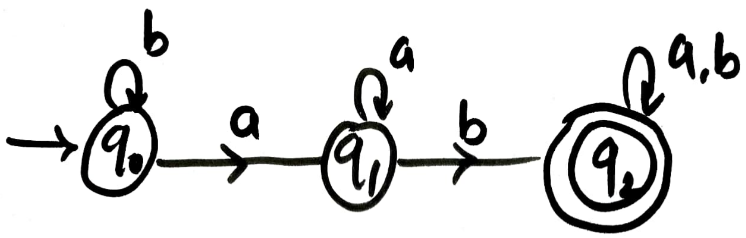
1) $w = ab \Rightarrow q_0 \xrightarrow{a} q_0 \xrightarrow{b} q_1$ Rejected

2) $w = ba \Rightarrow q_0 \xrightarrow{b} q_1 \xrightarrow{a} q_2$ Accepted

3) $w = aba \Rightarrow q_0 \xrightarrow{a} q_0 \xrightarrow{b} q_1 \xrightarrow{a} q_2$ Accepted

4) $w = abaab$ 5) $w = bababb$ 6) abba 7) baaba

1)



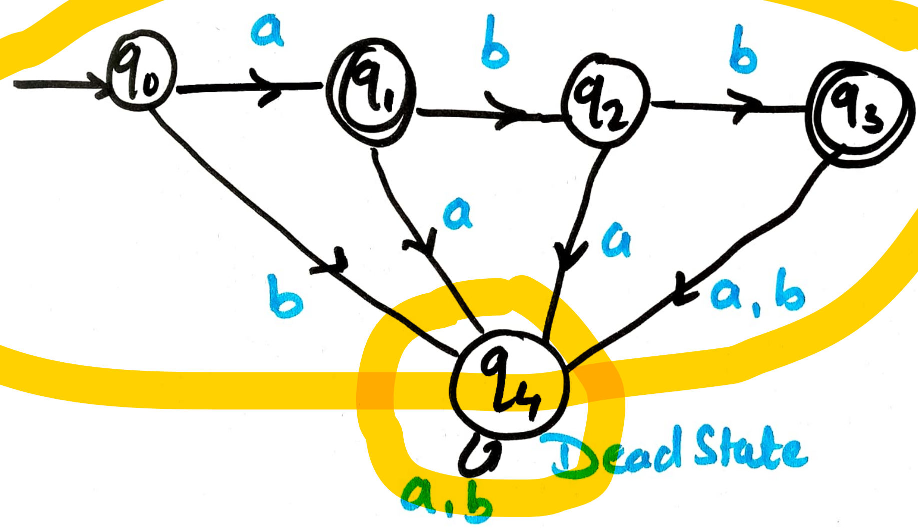
$w = x\,ab\,x$

1) ab 2) ba 3) aa 4) bb 5) aba

6) bab 7) aab 8) baba 9) aaaa 10) bbbba

$L = \{ w \in \Sigma^* \,/\, w$ containing the substring $ab \}$

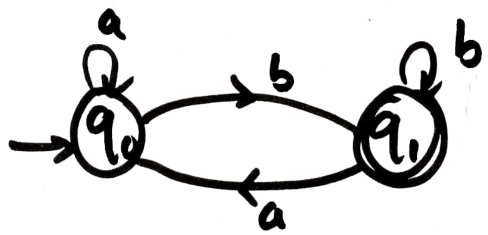
2)



$W = \{a, abb\}$

$\therefore L = \{ w \in \Sigma^* \mid w = (a, abb) \}$

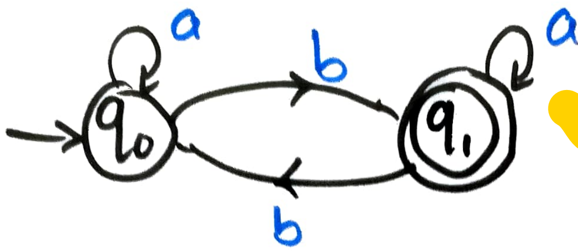
3)



$W = x\,b$

$\therefore L = \{ w \in \Sigma^* \mid w = x\,b \}$

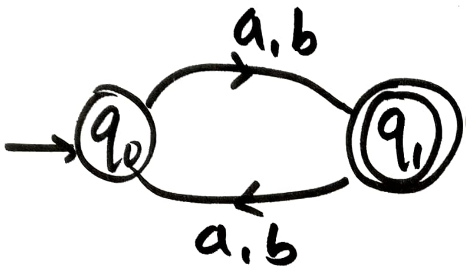
5>



Accept	Reject
b	bb
bbb	bbbb
bbbbb	

$L = \{ w \in \Sigma^* \mid \text{No. of } b\text{'s in } w = \text{odd} \}$

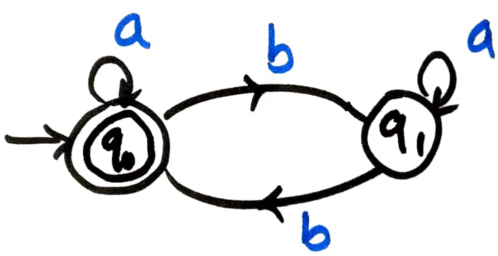
6>



Accept	Reject
aaa	aa
aab	bb
aba	

$L = \{ w \in \Sigma^* \mid |w| = \text{odd} \}$

7>



$L = \{ w \in \Sigma^* \mid \text{No. of } b\text{'s in } w = \text{even} \}$