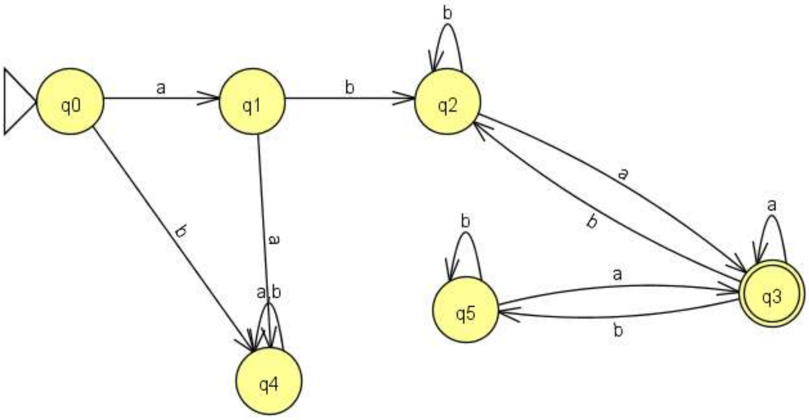
1. Construct a DFA over the language set L for ∑ = {a,b} such that it accepts strings starting with **ab** and ending with **ba.**

First of all, construct the Language set L

L = { aba, abbba, abababa, abaabbaaba, …..}

Next design the DFA as follows



Construct the Transition Table as per the below formula:

δ (q0, a) = q1

δ (q0, b) = q5 and so on

δ	a	b
➔ q_0	q_1	q_4
q_1	q_4	q_2
q_2	q_3	q_2
q_3	q_3	q_5
q_4	q_4	q_4
q_5	q_3	q_5

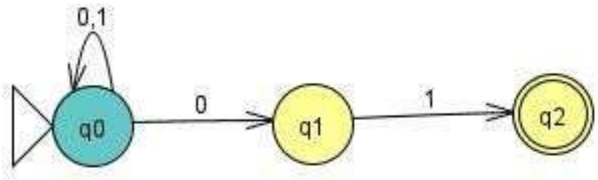
A = { Q = {$q_0, q_1, q_2, q_3, q_4, q_5$},
∑ = {a,b},
δ,
q_0,
F = { q_5}}

2. Construct an NFA over the language set L for ∑ = {0,1} such that it accepts strings ending with **01.**

First of all, construct the Language set L

L = {01, 00001, 111101, 0101001 10101001 …..}

Next design the NFA as follows



Construct the Transition Table as per the below formula:

δ (q0, 0) = q1

δ (q1, 1) = q2 and so on

δ	**0**	**1**
→ q_0	q_1	ϕ
q_1	ϕ	q_2
q_2	ϕ	ϕ

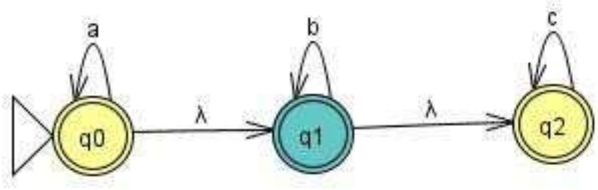
N = {Q ={q_0, q_1, q_2},
∑ = {0,1},
δ,
q_0,
F = { q_2}}

3. Construct an €-NFA over the language set L for ∑ = {a,b} such that it accepts strings containing zero or more a's followed by zero or more b's followed by zero or more c's.

Firstly define the Language set L

L = {€, a, b, c, aaa, bbb, ccc, abc, aaabbbccc …..}

Next design the € - NFA as follows



Construct the Transition Table as per the below formula:

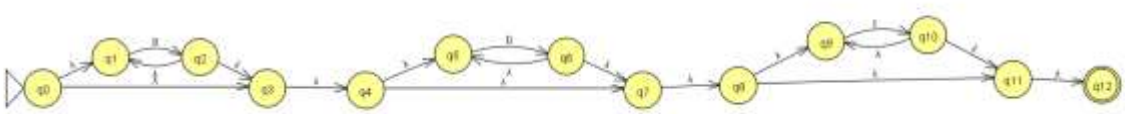
δ (q0, a) = q0

δ (q1, b) = q1 and so on

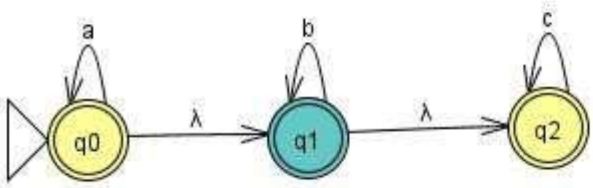
δ	a	b	c	€
➔ q_0	q_0	ϕ	ϕ	q_1
q_1	ϕ	q_1	ϕ	q_2
q_{2A}	ϕ	ϕ	q_2	ϕ

N = {{q_0, q_1, q_2}, {a,b}, δ, q_0, { q0,q1,q_2}}

A more formal way of framing €-NFA for the above problem



4. Convert the following €-NFA into its DFA form



Firstly, draw the transition table of above automata as per the below formula:

δ (q0, a) = q0

δ (q1, b) = q1 and so on

δ	a	b	c	€
➔ q_0	q_0	ϕ	ϕ	q_1
q_1	ϕ	q_1	ϕ	q_2
q_2	ϕ	ϕ	q_2	ϕ

Determine the €- closure of each state as follows:

€- closure of

q0 = {q0, q1, q2}

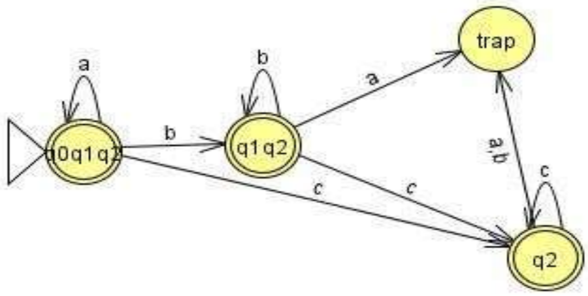
q1 = {q1, q2}

q2 = {q2}

Put the transition table for the DFA referring to above €- closures.

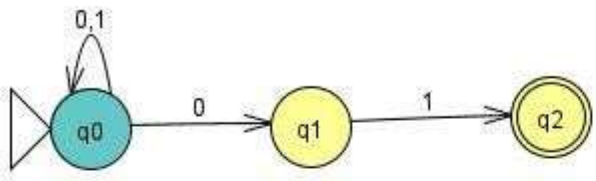
δ	a	b	c
➔ {q0, q1, q2}	{q0, q1, q2}	{q1, q2}	{q2}
{q1, q2}	ϕ	{q1, q2}	{q2}
{q2}	ϕ	ϕ	{q2}

Now put the final converted DFA as below



N = {{{q_0, q_1, q_2}{q1,q2},{q2}}, {a,b}, δ, q0q1q2, {{ q_0, q_1, q_2}{q1,q2},{q2}}}

5. Convert the below shown NFA to its DFA form



Construct the Transition Table as per the below formula:

δ (q0, 0) = q1

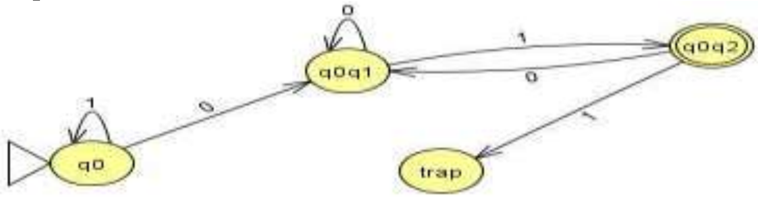
δ (q1, 1) = q2 and so on

δ	0	1
➔ q_0	q0, q1	q0
q_1	ϕ	q_2
q_2	ϕ	ϕ

Construct the transition table for its DFA

δ	0	1
→ q_0	q0, q1	q0
q0, q1	q0, q1	q0, q2
q0, q2	q0, q1	q_0

Now put the final DFA as below



Whichever state contains q2 will be the final state and initial state remains as it is.