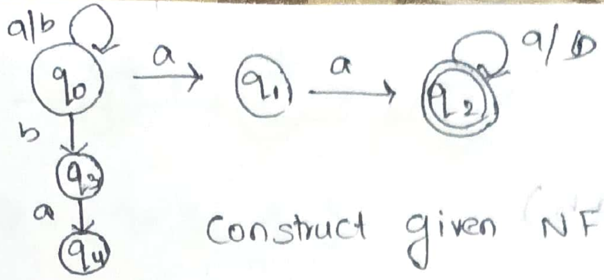
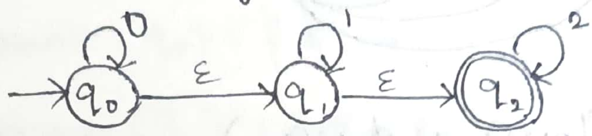
Assignment - 2
21-8-24

1. 

Construct given NFA and check whether the string ab , aab accepted or not

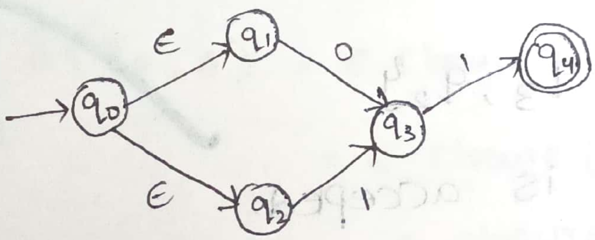
2. Construct NFA accepting 01^*0^*1

3. Convert the following NFA with Epsilon and without epsilon



$Q_0 = q_0$
$f = q_2$

4. Convert NFA to DFA



Answers :-

1.

δ	a	b
q_0	q_0, q_1	q_0, q_3
q_1	q_2	ϕ
q_2	q_2	q_2
q_3	q_4	ϕ
q_4	ϕ	ϕ

$Q = \{q_0, q_1, q_2, q_3, q_4\}$

$\Sigma = a, b$

$Q_0 = q_0$

$f = q_2$

i) a b

$\delta(q_0, ab)$

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

$\delta(q_0 \cup q_3 \cup \phi)$

$\delta(q_0, q_3)$

$\therefore$ string is not accepted

ii) aab

$\delta(q_0, aab)$

$\delta(q_0 \cup q_1, ab)$

$\delta(q_0 \cup q_1 \cup q_2, b)$

$\delta(q_0 \cup q_3 \cup \phi \cup q_2)$

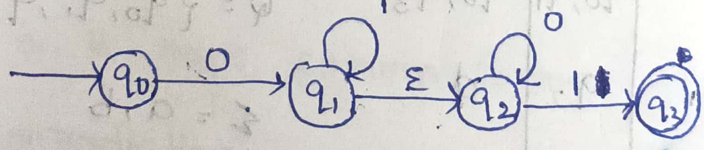
$\delta(q_0 \cup q_3 \cup q_2)$

$\{q_0, q_3, q_2\}$

∴ String is accepted.

(2) NFA of 01^*0^*1

Language = {00, 11, 10, 01 - - - }



$Q = \{q_0, q_1, q_2, q_3\}$

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

$Q_0 = q_0$

$F = q_3$

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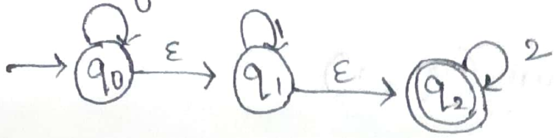


NFA with ε to without

Transition with ε

δ	0	1	2
q_0	q_0	q_0, q_1, q_2	q_0, q_1, q_2
q_1	ϕ	q_1	ϕ
q_2	ϕ	ϕ	q_2

i) $Q = \{q_0, q_1, q_2\}$

$\Sigma = \{0, 1, 2\}$

$q_0 = q_0$

$f = q_2$

ii) $\epsilon \text{ closure } (q_0) = \{q_0, q_1, q_2\}$

$\epsilon \text{ closure } (q_1) = \{q_1, q_2\}$

$\epsilon \text{ closure } (q_2) = \{q_2\}$

iii) $\delta(q_0, 0) = \epsilon \text{ closure } (\{q_0, q_1, q_2\}, 0)$

$= \epsilon \text{ closure } (q_0 \cup \phi \cup \phi)$

$= \epsilon \text{ closure } (q_0)$

$= \{q_0, q_1, q_2\}$

$\delta(q_0, 1) = \epsilon \text{ closure } (\{q_0, q_1, q_2\}, 1)$

$= \epsilon \text{ closure } (\phi \cup q_1 \cup \phi)$

$= \epsilon \text{ closure } (q_1)$

$= \{q_1, q_2\}$

$\delta(q_0, 2) = \epsilon \text{ closure } (\{q_0, q_1, q_2\}, 2)$

$= \epsilon \text{ Closure } (\phi \cup \phi \cup q_2)$

$= \epsilon \text{ closure } (q_2)$

$= \{q_2\}$

$\delta(q_1, 0) = \epsilon \text{ closure } (\{q_1, q_2\}, 0)$

$= \epsilon \text{ closure } (\phi \cup \phi)$

$= \phi$

$\delta(q_1, 1) = \epsilon\text{ Closure}(q_1, 1)$

$\epsilon\text{ closure}(\{q_1, q_2\}, 2)$

$\epsilon\text{ Closure}(q_1 \cup \phi)$

$\epsilon\text{ closure}(q_1)$

$= q_1, q_2$

$\delta(q_1, 2) = \epsilon\text{ Closure}(q_1, 2)$

$= \epsilon\text{ Closure}(\{q_1, q_2\}, 2)$

$= \epsilon\text{ closure}(\phi \cup q_2)$

$= \epsilon\text{ closure}(q_2)$

$\delta(q_1, 2) = q_2$

$\delta(q_2, 0) = \epsilon\text{ Closure}(q_2, 0)$

$= \epsilon\text{ Closure}(q_2, 0)$

$\delta(q_2, 0) = \phi$

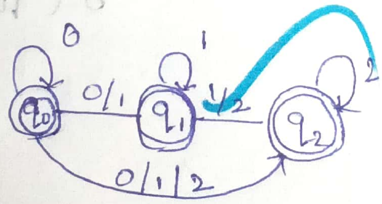
$\delta(q_2, 1) = \epsilon\text{ closure}(q_2, 1)$

$= \phi$

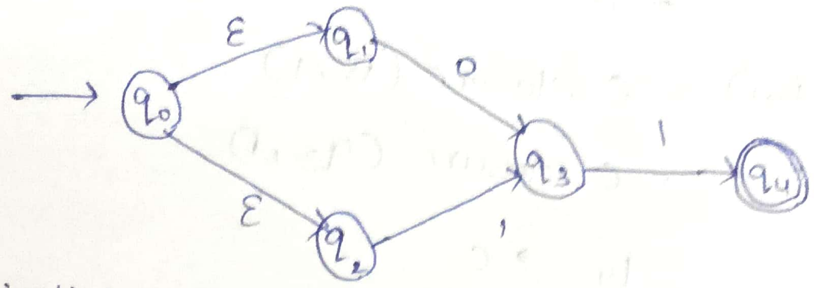
$\delta(q_2, 2) = \epsilon\text{ closure}(q_2, 2)$

$= q_2$

δ	0	1	2
q_0	q_0, q_1, q_2	q_1, q_2	q_2
q_1	ϕ	q_1, q_2	q_2
q_2	ϕ	ϕ	q_2



4) Given,



i) initial $= q_0$

final state $= q_4$

i/p - 0,1

ii) ϵ closure $(q_0) = \{q_0, q_1, q_2\} \rightarrow$ A

ϵ closure $(q_1) = \{q_1\}$

ϵ closure $(q_2) = \{q_2\}$

ϵ closure $(q_3) = \{q_3\}$

ϵ closure $(q_4) = \{q_4\}$

$\delta(A,0) = \epsilon$ closure $(A,0)$

ϵ closure $(\{q_0, q_1, q_2\}, 0)$

ϵ closure $(\phi \cup q_3 \cup \phi)$

ϵ closure (q_3)

$q_3 \rightarrow B$

$\delta(A,1) = \epsilon$ closure $(A,1)$

$= \epsilon$ closure $(\{q_0, q_1, q_2\}, 1\})$

$= \epsilon$ closure $(\phi \cup \phi \cup q_3)$

$= \epsilon$ closure (q_3)

$q_3 \rightarrow B$

$\delta(B,0) = \epsilon$ closure $(B,0)$

$= \epsilon$ closure $(q_3, 0)$

$= \phi$

$\delta(B,1) = \epsilon\ closure\ (B,1)$

$= \epsilon\ closure\ (q_3,1)$

$= q_4 \rightarrow C$

$\delta(C,0) = \epsilon\ closure\ (C,0)$

$\epsilon\ closure\ (q_4,0)$

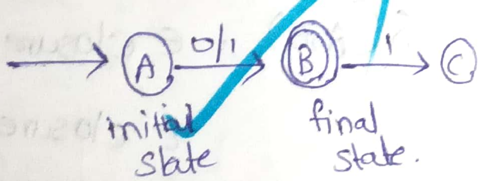
$= \phi$

$\delta(C,1) = \epsilon\ closure\ (C,1)$

$= \epsilon\ closure\ (q_4,1)$

$= \phi$

	0	1
$\rightarrow A$	q_3 B	q_3 (B)
* B	ϕ	q_4 (C)
C	ϕ	ϕ



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