Subject: Automata

Date: Nov 8th, 2020

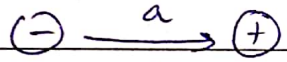
# Assignment 2

Momina Atif Dar
P18-0030
Section B

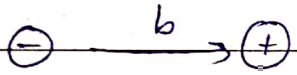
## Question 1 RE → NFA

(a) $((b|a)^* | (b|a))^* (ab)^*$

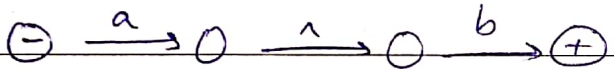
a



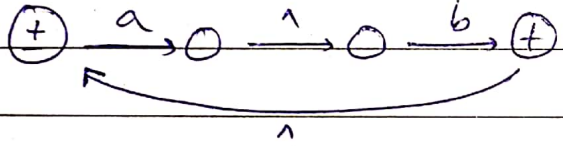

b



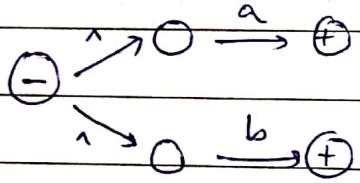

ab



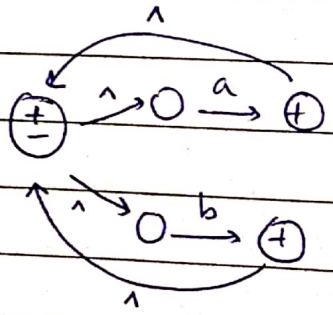

$(ab)^*$




$(b|a)$

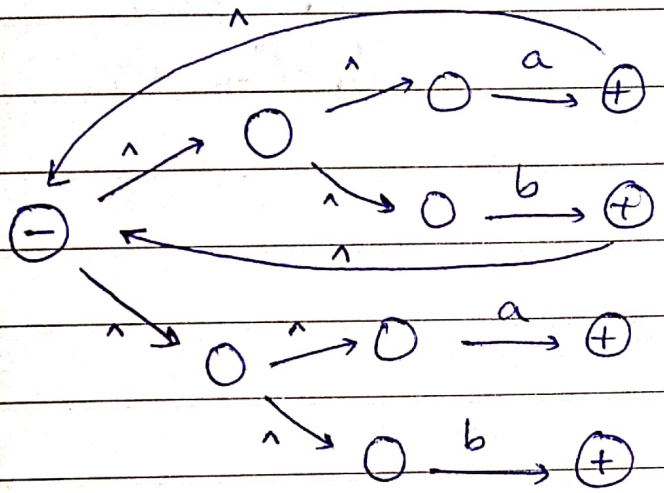



$(b|a)^*$

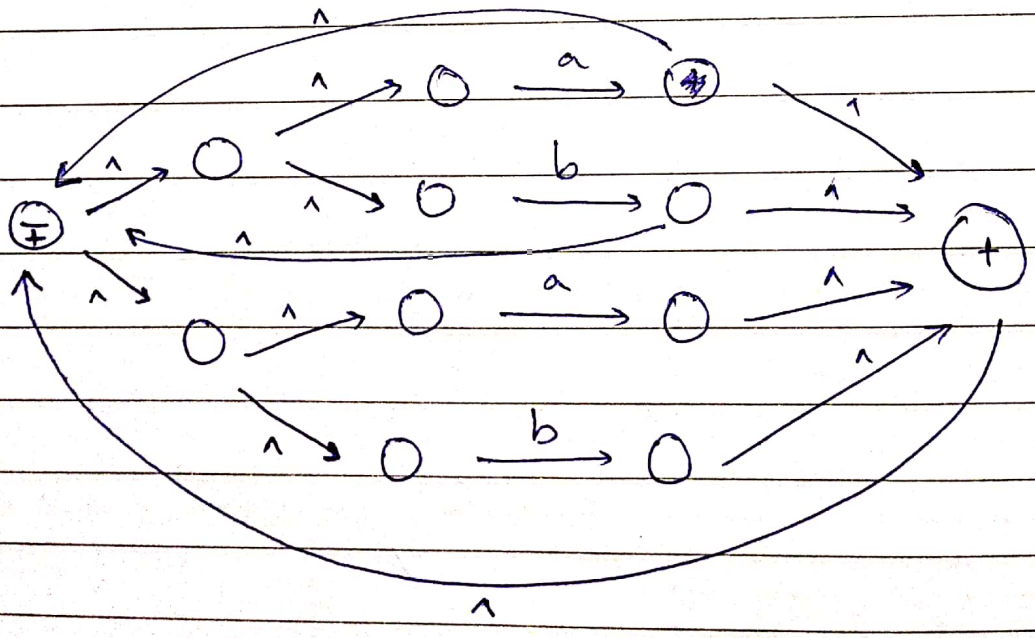


Subject: _____ Dat

$(b|a)^*|(b|a)$

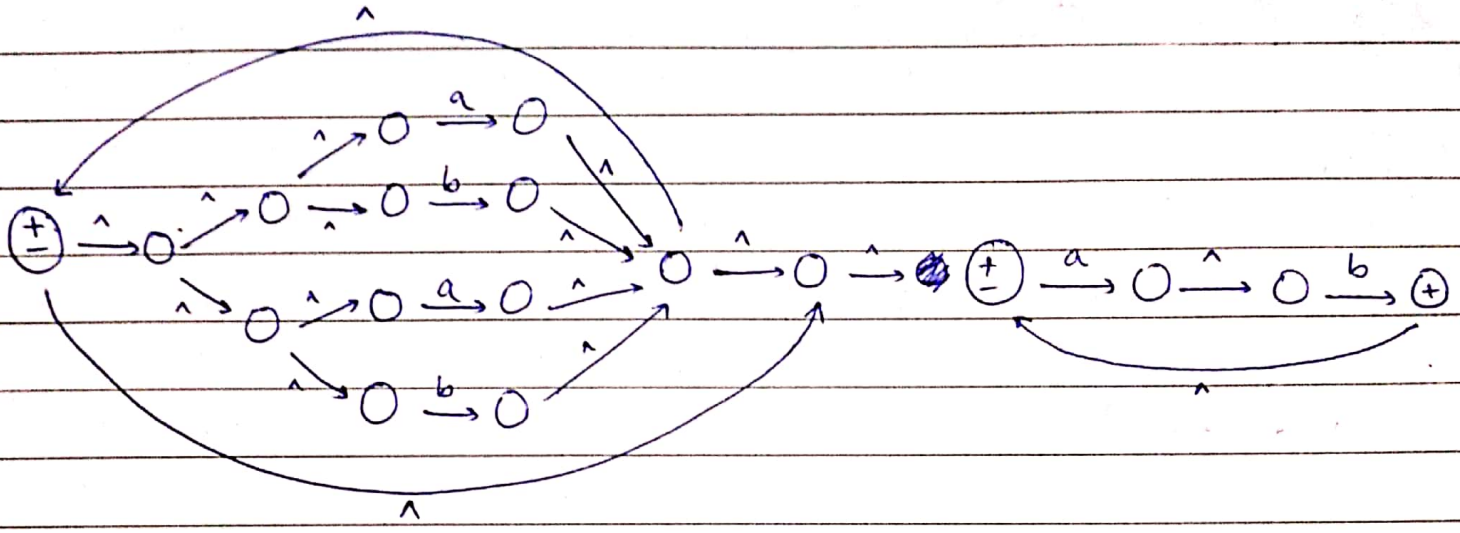



$((b|a)^*|(b|a))^*$



Subject: Date:

$$\left((b|a)^* \mid (b|a)\right)^* (ab)^*$$



---

(b) $a(aa)^* + \left(a(aa)^* b + b\right)^* \left(\lambda + a(aa)^*\right)$

$a$ ⊖ —a→ ⊕

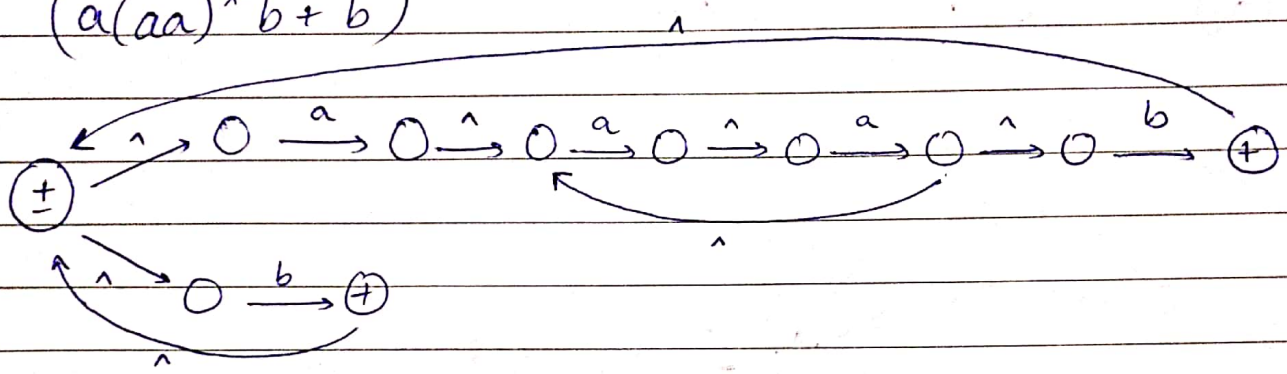
$aa$ ⊖ —a→ ○ —^→ ○ —a→ ⊕

$(aa)^*$ ⊖ —a→ ○ —^→ ○ —a→ ⊕ (with ^ back to start)

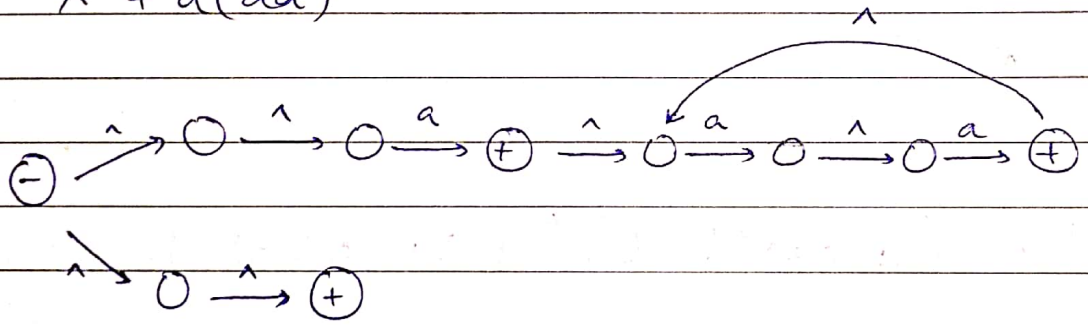
$a(aa)^*$ ⊖ —a→ ⊕ —^→ ○ —a→ ○ —^→ ○ —a→ ⊕ (with ^ back to ⊕)

$a(aa)^* b$ ⊖ —a→ ○ —^→ ○ —a→ ○ —^→ ○ —a→ ○ —^→ ○ —b→ ⊕ (with ^ back to ⊖)

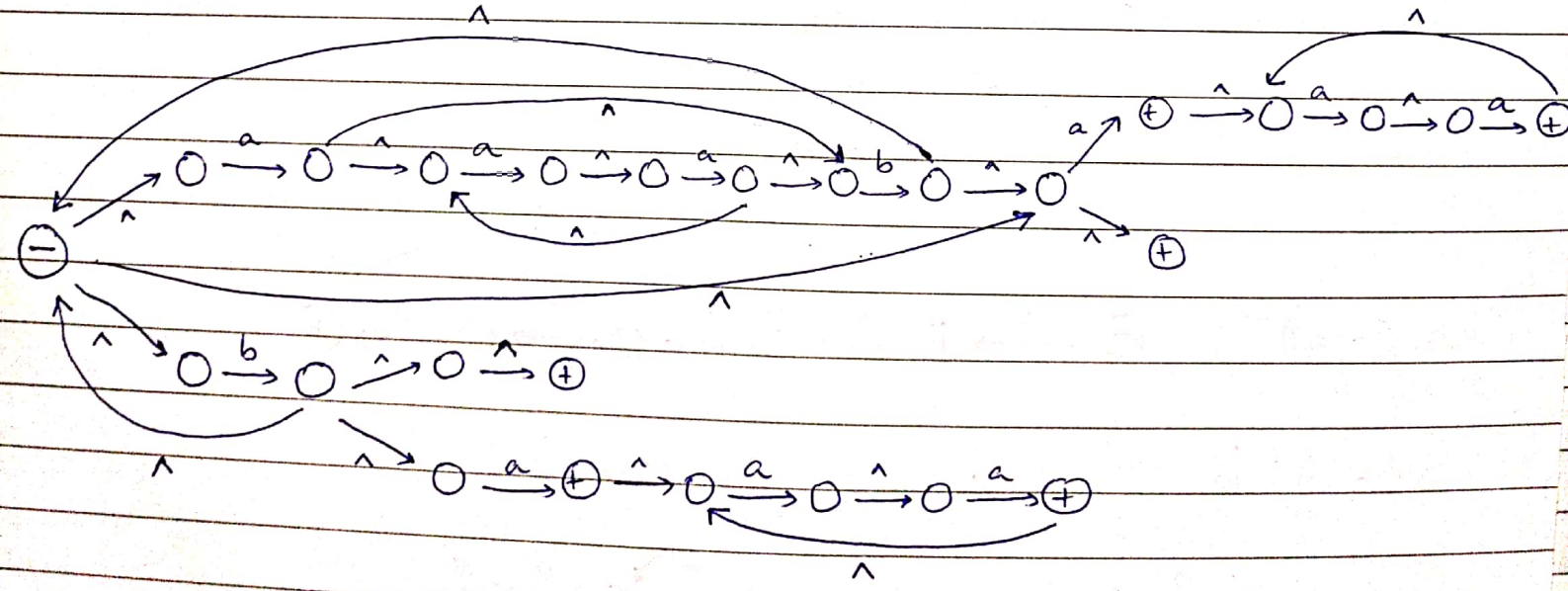
$(a(aa)^*b+b)^*$



$\lambda + a(aa)^*$

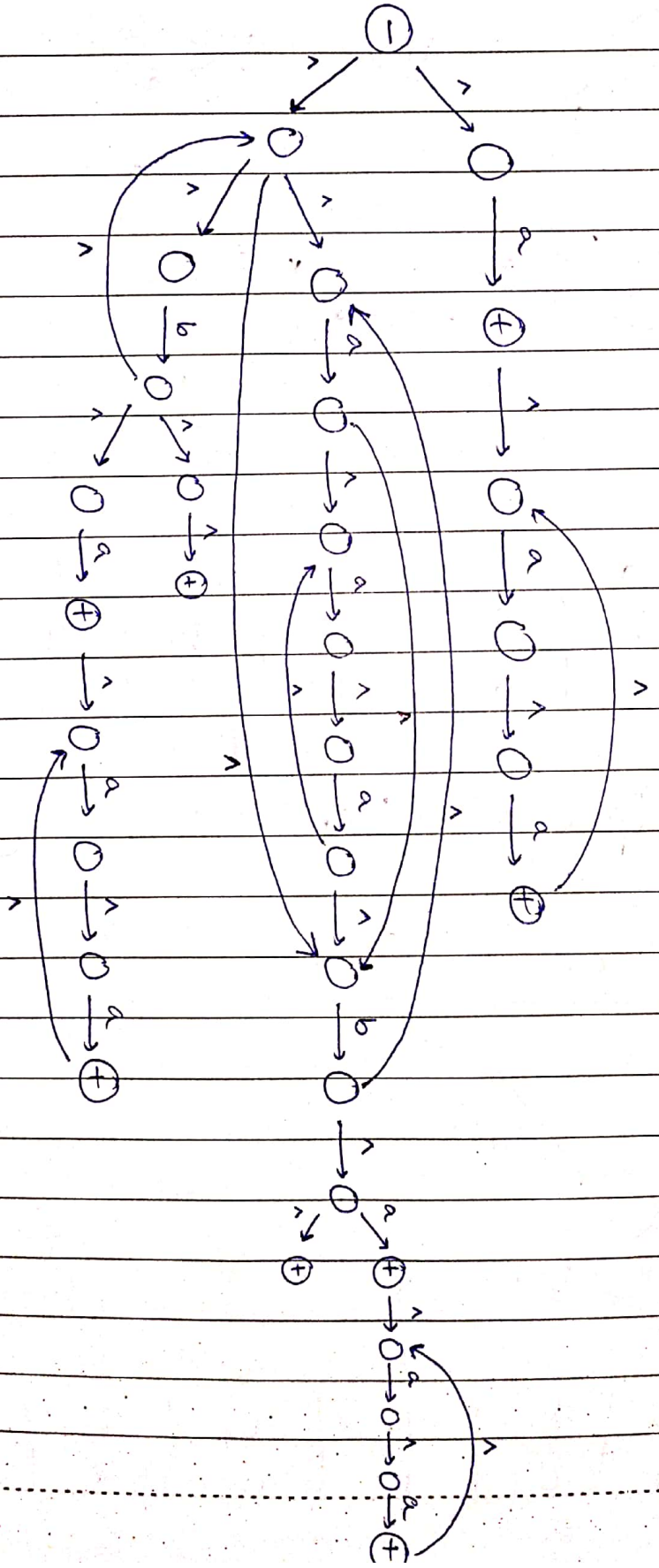


$(a(aa)^*b+b)^*\ (\lambda + a(aa)^*)$



Date:

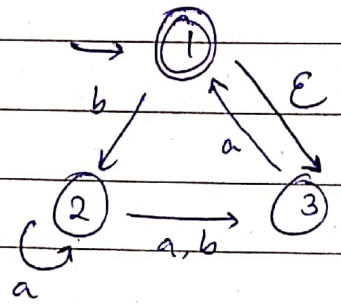
$a(aa)^* + (a(aa)^* b + b)^* (\lambda + a(aa)^*)$



Subject: _____

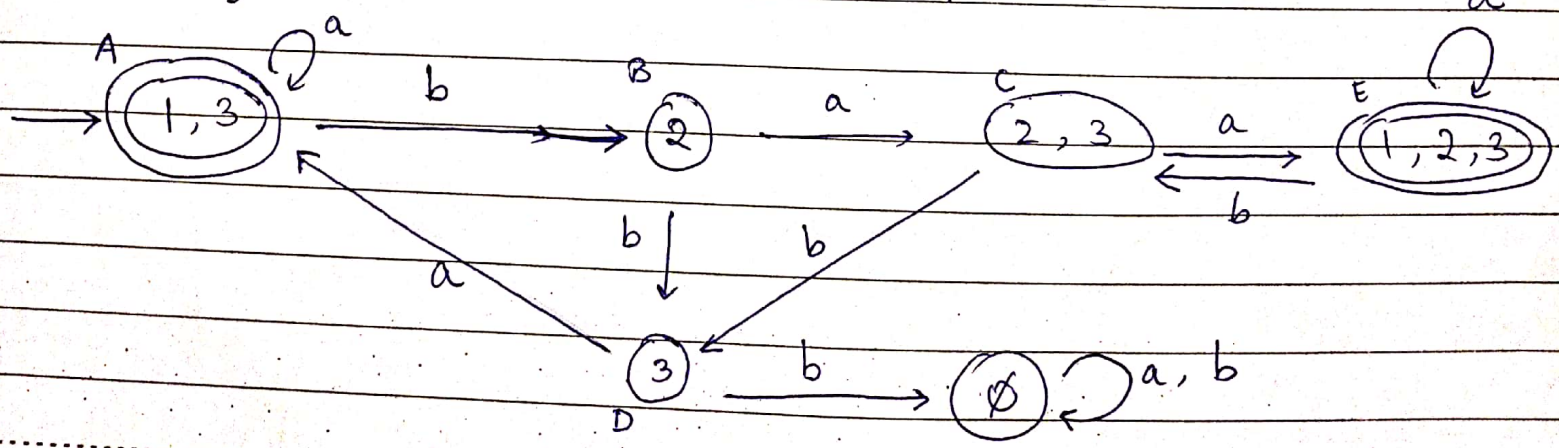
# Question 2 NFA to DFA

(a)



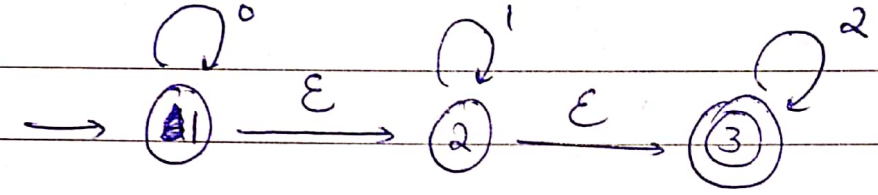

A = ε-closure({1}) = {1, 3}
B = ε-closure({2}) = {2}
C = ε-closure({2,3}) = {2,3}
D = ε-closure({3}) = {3}
E = ε-closure({2,3,1}) = {2, 3, 1}

| NFA State | DFA State | a | b |
|---|---|---|---|
| {1, 3} | A | A | B |
| {2} | B | C | D |
| {2, 3} | C | E | D |
| {3} | D | A | ∅ |
| {1, 2, 3} | E | E | C |



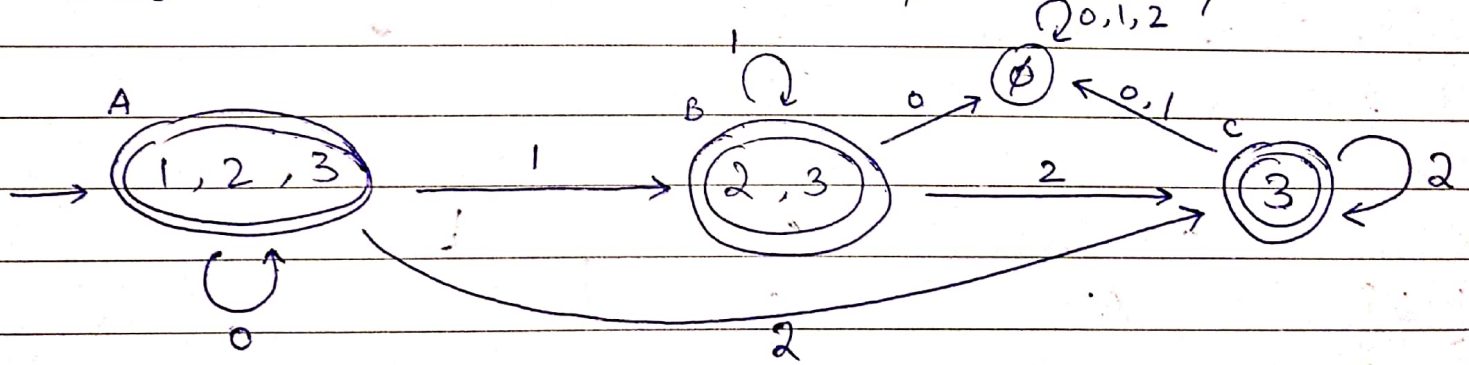
Subject: _____ Date: _____

(b)




A = ε-closure ({1}) = {1, 2, 3}
B = ε-closure ({2}) = {2, 3}
C = ε-closure ({3}) = {3}

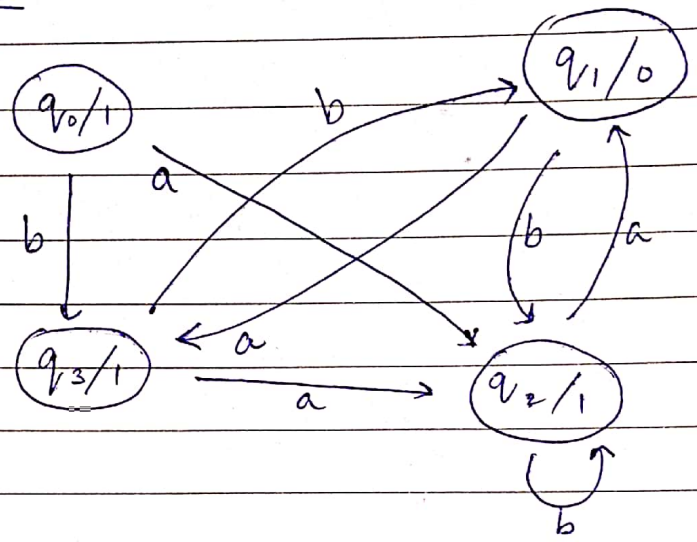
| NFA State | DFA State | 0 | 1 | 2 |
|---|---|---|---|---|
| {1, 2, 3} | A | A | B | C |
| {2, 3} | B | ∅ | B | C |
| {3} | C | ∅ | ∅ | C |



Subject:

# Question 3

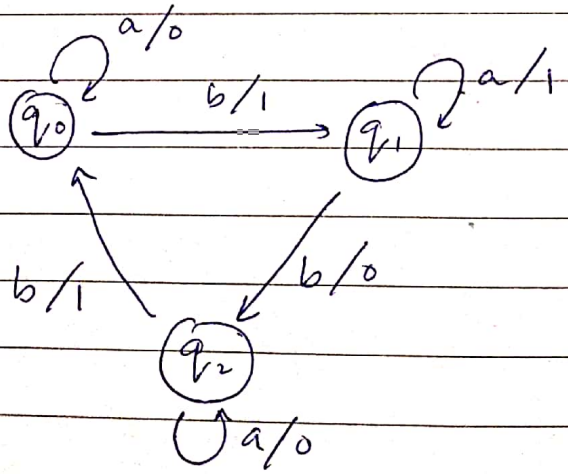
(a)




| | | a | a | b | a | b |
|---|---|---|---|---|---|---|
| States | $q_0$ | $q_2$ | $q_1$ | $q_2$ | $q_1$ | $q_2$ |
| Output characters | 1 | 1 | 0 | 1 | 0 | 1 |

Output = 1 1 0 1 0 1

(b)




Output = 0 0 1 1 0

| | a | a | b | a | b | |
|---|---|---|---|---|---|---|
| States | $q_0$ | $q_0$ | $q_0$ | $q_1$ | $q_1$ | $q_2$ |
| Output characters | 0 | 0 | 1 | 1 | 0 | |