

ASSIGNMENT 2 :-

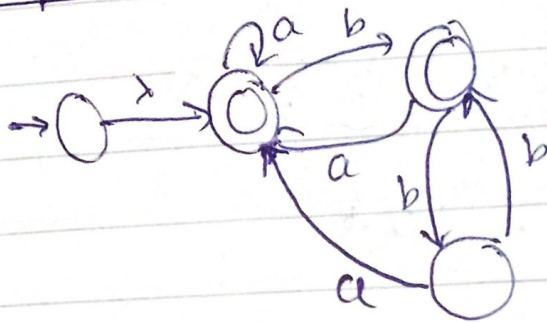
Name : Syed Mohsin Ahmed

Roll No : 20K-0124

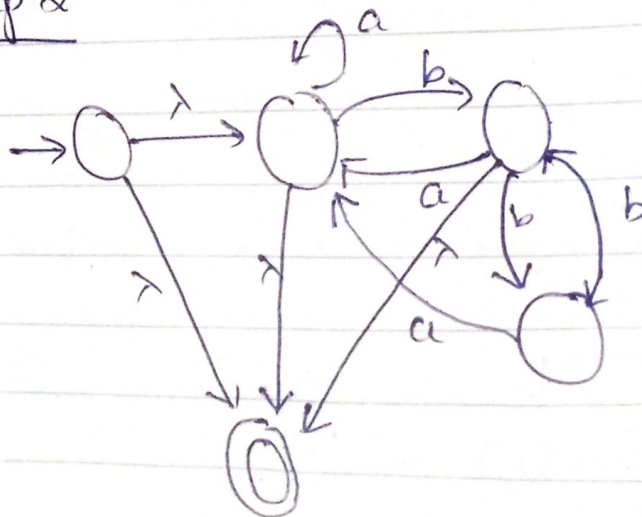
Section : BCS-4B

QUESTION 1 :

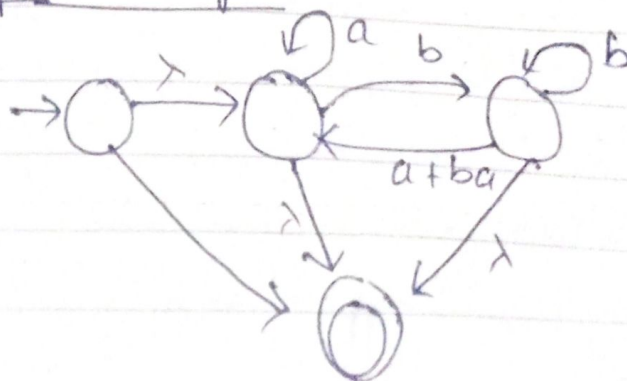
Step 1 :

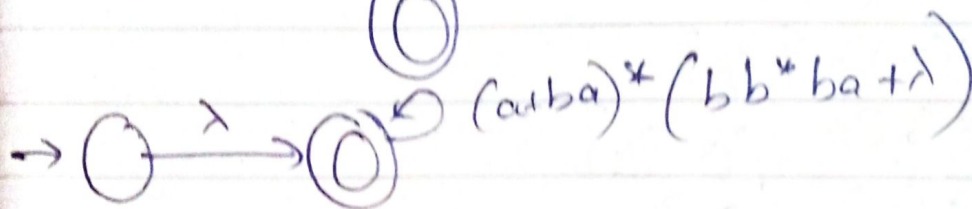
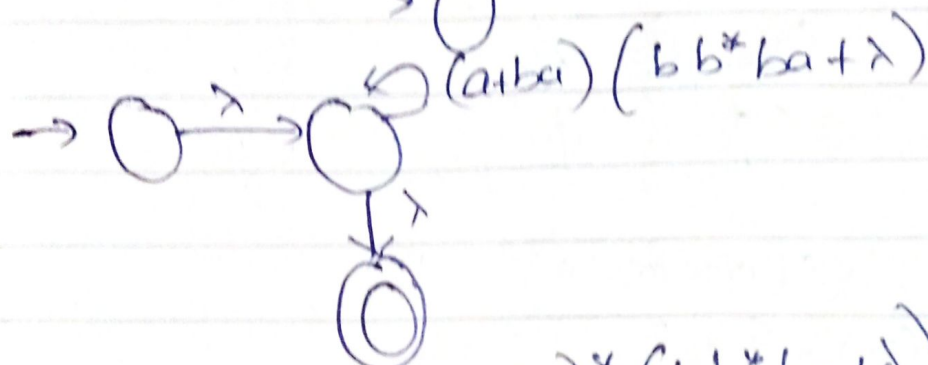
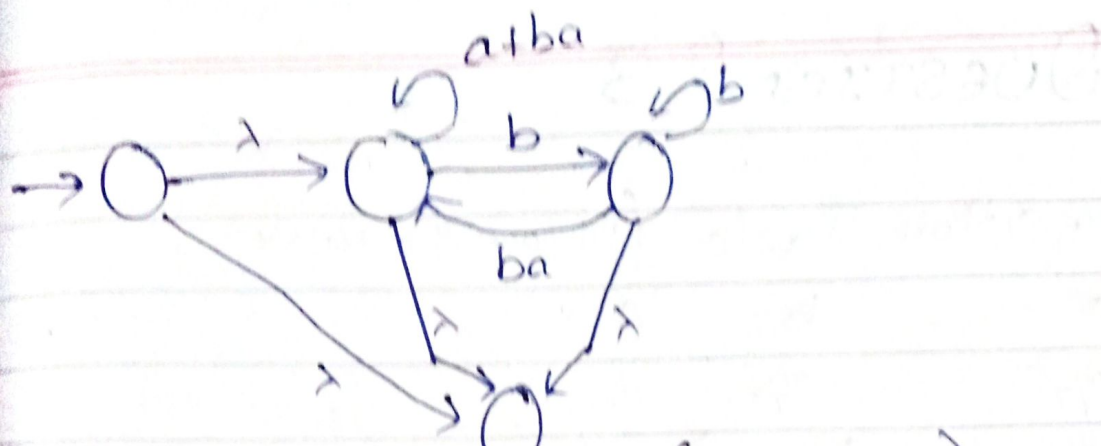


Step 2



Step 3 and Step 4

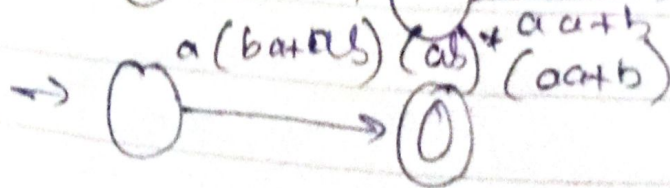
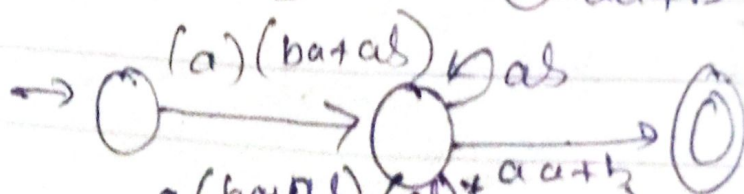
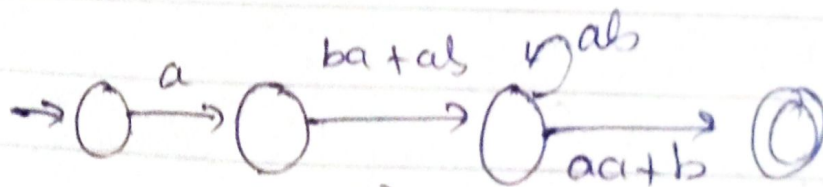




$$\therefore R.E = (a+ba)^* (bb^*ba + \lambda)$$

QUESTION 2:

No need for step 1 and step 2. Moving onto state elimination.



$$\therefore R.E = a(ba+ab)(ab)^*(aa+b)$$

QUESTION 3

States	a	b
q_1	q_2, q_3	\emptyset
q_2	\emptyset	q_3, q_2
q_3	q_2	\emptyset

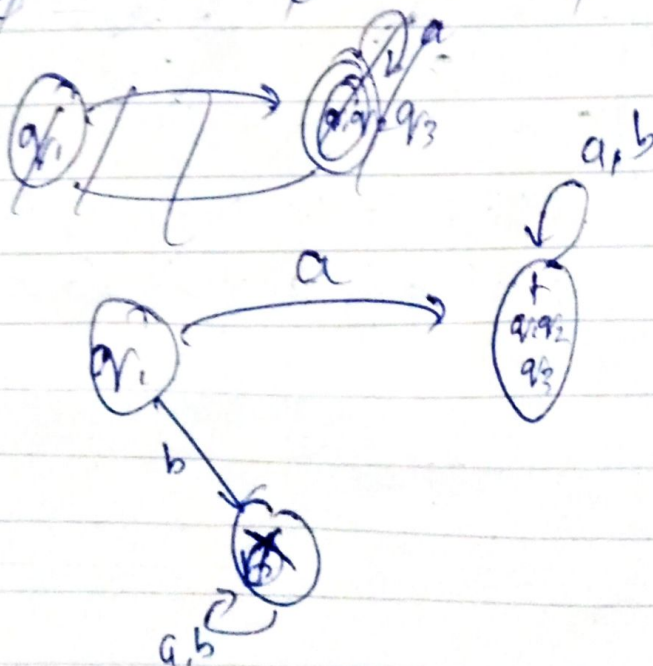
ε -enclosure

$$\varepsilon(q_1) = \{q_1\}$$

$$\varepsilon(q_2) = \{q_2, q_1\}$$

$$\varepsilon(q_3) = \{q_3\}$$

States	a	b
q_1	q_1, q_2, q_3	\emptyset
$+q_1, q_2, q_3$	q_1, q_2, q_3	q_1, q_2, q_3
\emptyset	\emptyset	\emptyset

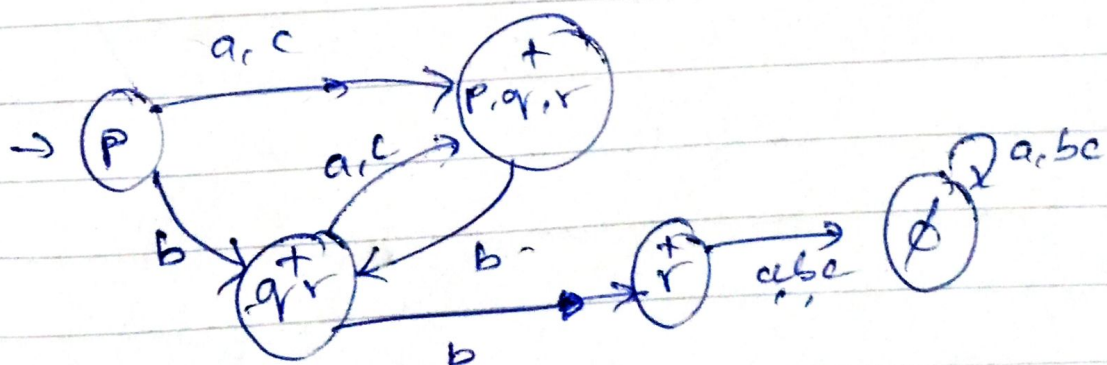


QUESTION 4

States	a	b	c
p	$\{p, q, r\}$	$\{q, r\}$	$\{p, q, r\}$
q	$\{p, q, r\}$	r	$\{p, q, r\}$
r	\emptyset	\emptyset	\emptyset

States	a	b	c
→ p	$\{p, q, r\}$	$\{q, r\}$	$\{p, q, r\}$
+ {q, r}	$\{p, q, r\}$	$\{q, r\}$	$\{p, q, r\}$
+ {p, q, r}	$\{p, q, r\}$	$\{r\}$	$\{p, q, r\}$
+ r	\emptyset	\emptyset	\emptyset
\emptyset	\emptyset	\emptyset	\emptyset

DFA



QUESTION # 5

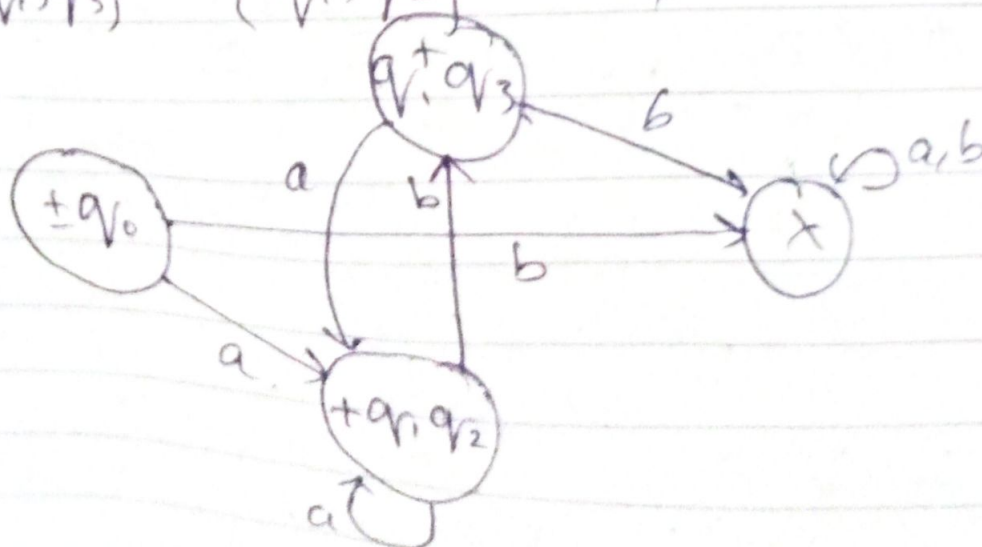
(NFA TO DFA)

Transition Table

	a	b
q_0	$\{q_1, q_2\}$	\emptyset
q_1	$\{q_1, q_2\}$	\emptyset
q_2	\emptyset	$\{q_1, q_3\}$
q_3	$\{q_1, q_2\}$	\emptyset

States Table

	a	b
$\pm q_0$	$\{q_1, q_2\}$	\emptyset
$\pm \{q_1, q_2\}$	$\{q_1, q_2\}$	$\{q_1, q_3\}$
\emptyset	\emptyset	\emptyset
$\pm \{q_1, q_3\}$	$\{q_1, q_2\}$	\emptyset



QUESTION 6:0

Transition Table (for Union and Intersection)

states	0	1
$z_1 = (x_1, y_0)$	$z_2 = (x_2, y_0)$	$z_3 = (x_1, y_1)$
$z_2 = (x_2, y_0)$	$z_1 = (x_1, y_0)$	$z_4 = (x_2, y_1)$
$z_3 = (x_1, y_1)$	$z_5 = (x_2, y_1)$	$z_1 = (x_1, y_0)$
$z_4 = (x_2, y_1)$	$z_6 = (x_1, y_2)$	$z_2 = (x_2, y_0)$
$z_5 = (x_2, y_2)$	$z_3 = (x_1, y_1)$	$z_5 = (x_2, y_2)$
$z_6 = (x_1, y_2)$	$z_4 = (x_2, y_1)$	$z_6 = (x_1, y_2)$

Here $x_1 = S_1$, $x_2 = S_2$ [Figure 6]

$y_0 = S_0$, $y_1 = S_1$, $y_2 = S_2$ [Figure 7]

Concatenation Table

States	0	1
$z_1 = x_1$ - (initial)	$z_2 = x_2$	$z_3 = x_1 y_0$
$z_2 = x_2$	$z_3 = x_1 y_0$	$z_2 = x_2$
$z_3 = x_1 y_0$ + (final)	$z_4 = x_2 y_0$	$z_5 = x_1 y_0 y_1$
$z_4 = x_2 y_0$ +	$z_3 = x_1 y_0$	$z_6 = x_2 y_1$
$z_5 = x_1 y_0 y_1$ +	$z_7 = x_2 y_0 y_2$	$z_5 = x_1 y_1 y_0$
$z_6 = x_2 y_1$	$z_3 = x_1 y_0 x_1 y_0$	$z_4 = x_2 y_0$
$z_7 = x_2 y_0 y_2$ +	$z_5 = x_1 y_0 y_1$	$z_8 = x_2 y_1 y_2$
$z_8 = x_2 y_1 y_2$	$z_9 = x_1 y_0 y_2 y_1$	$z_7 = x_2 y_0 y_2$
$z_9 = x_1 y_0 y_1 y_2$ +	$z_{10} = x_1 y_0 x_2 y_0 y_2 y_1$	$z_9 = x_1 y_0 y_1 y_2$
$z_{10} = x_2 y_0 y_1 y_2$ +	$z_{11} = x_1 y_0 y_2$	$z_8 = x_2 y_1 y_2$
$z_{11} = x_1 y_0 y_2$ +	$z_{12} = x_2 y_0 y_1$	$z_9 = x_1 y_0 y_1 y_2$
$z_{12} = x_2 y_0 y_1$ +	$z_{11} = x_1 y_0 y_2$	$z_{12} = x_2 y_1 y_0$

Union Of The Two FA

Part (2)

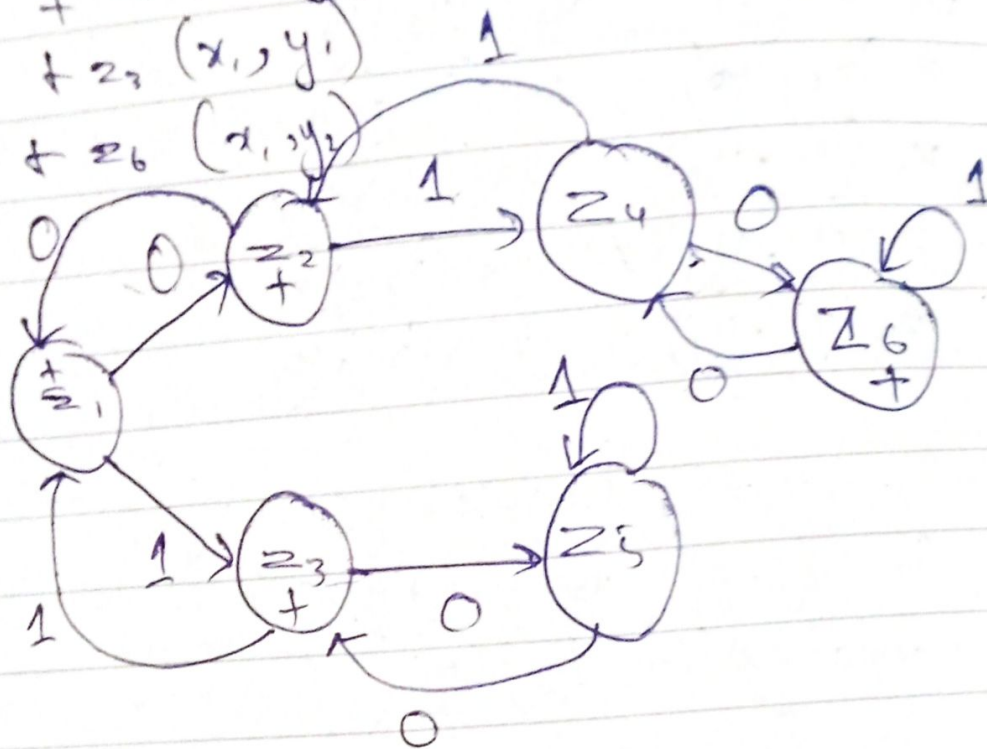
Final states

$+ z_1 (x_1, y_0)$

$+ z_2 (x_2, y_0)$

$+ z_3 (x_1, y_1)$

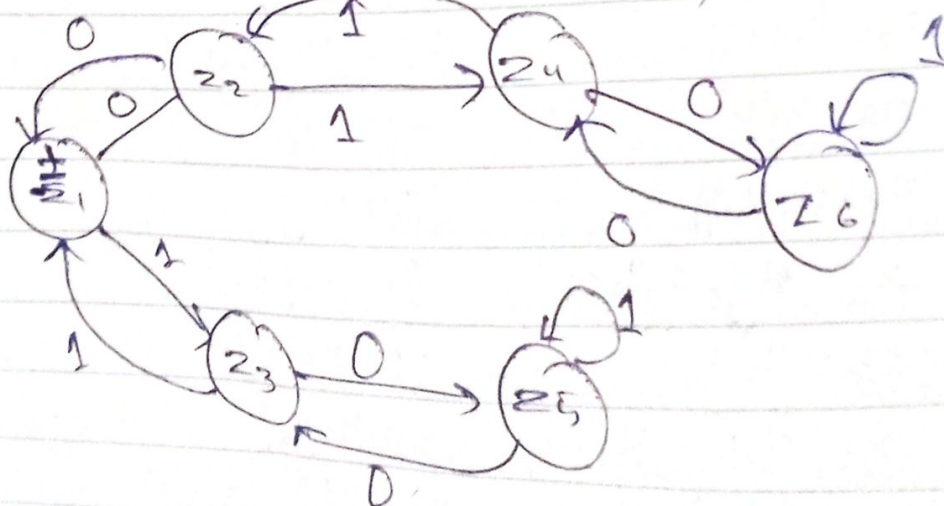
$+ z_6 (x_1, y_1)$



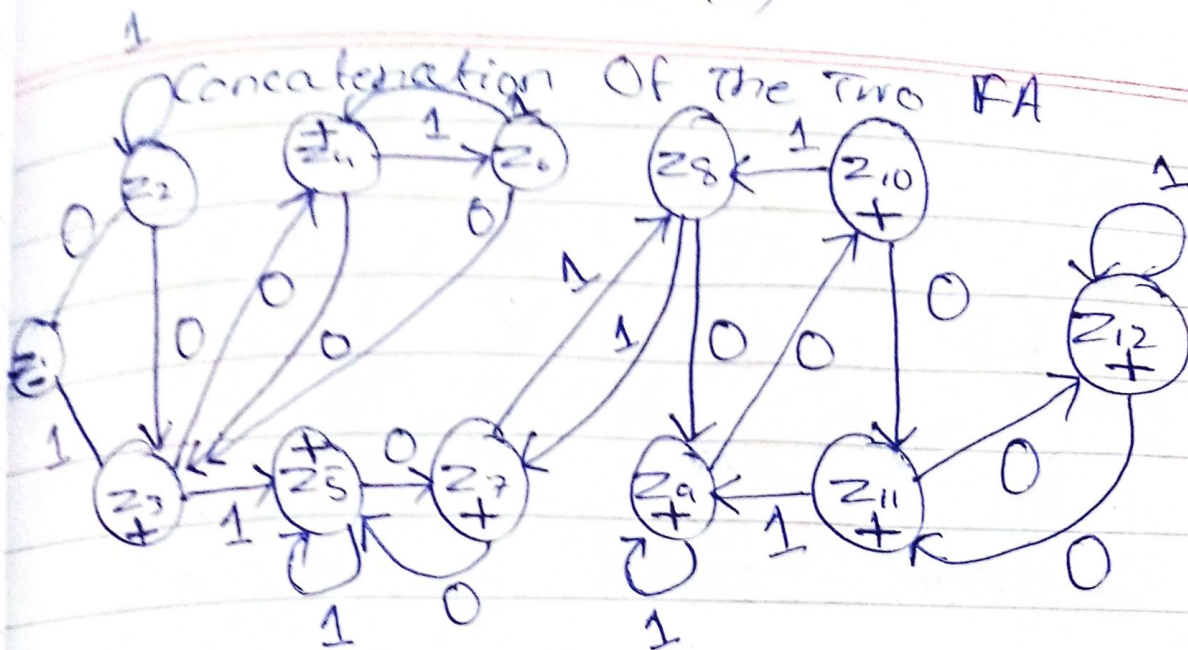
Intersection Of The Two FA

part (3)

Final states $+ z_1 = (x_1, y_0)$

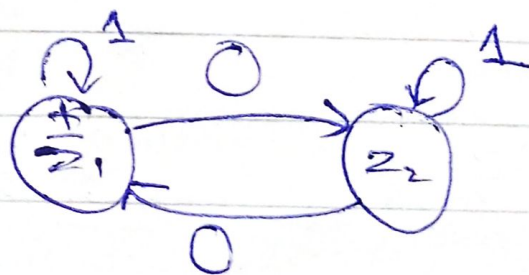
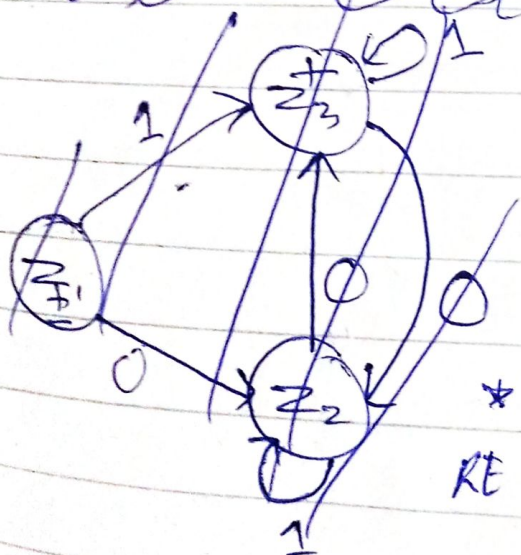


Part (1)



Closure Of FA1 (Part 4)

States	0	1
$z_1 = \{x_1\}$	$z_2 = \{x_2\}$	$z_1 = \{x_1\}$
$z_2 = \{x_2\}$	$z_1 = \{x_1\}$	$z_2 = \{x_2\}$
$z_1 = \{x_1\}$	$z_2 = \{x_2\}$	$z_2 = \{x_2\}$



* It would be same as the RE already accepts lambda.