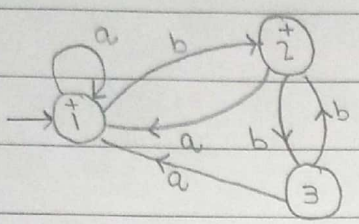
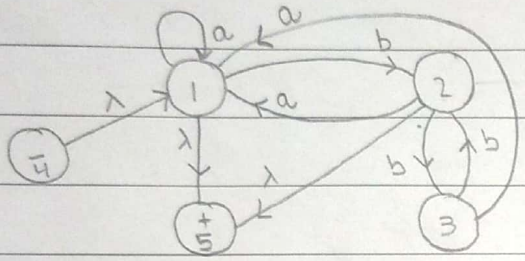
INSHA SAMNANI
20K-0247

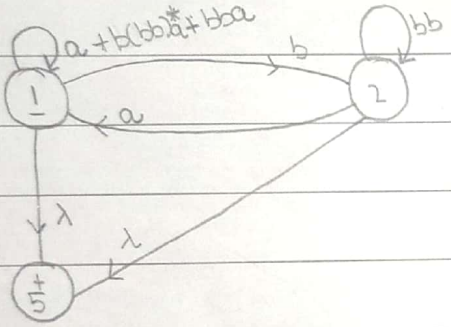
TOA ASSIGNMENT 2

Date

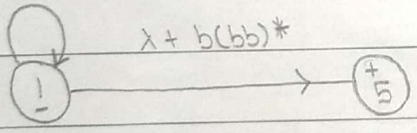
QUESTION 1:



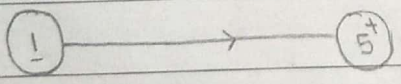




$a+bba+b(bb)^*a+b(bb)^*a$



$(a+bba+b(bb)^*a)^*(\lambda+b(bb)^*)$



Resulting RE: $(a+bba+b(bb)^*a)^*(\lambda+b(bb)^*)$

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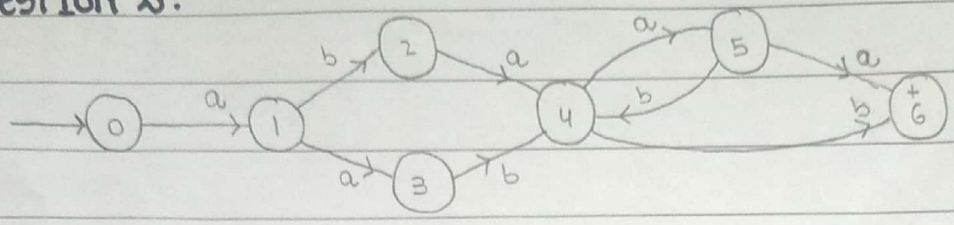
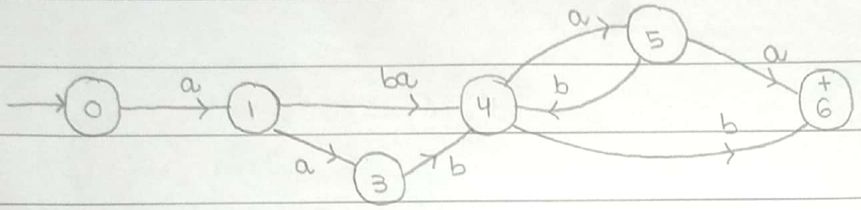
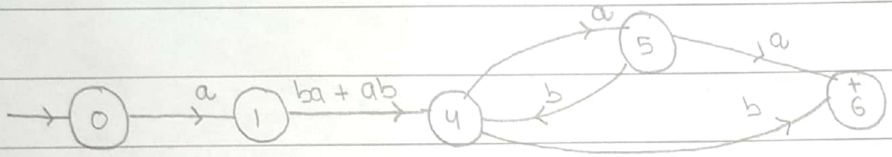
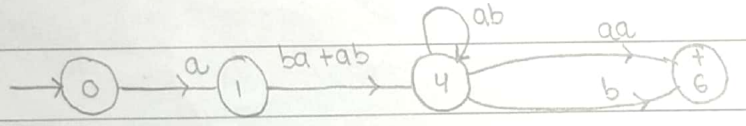
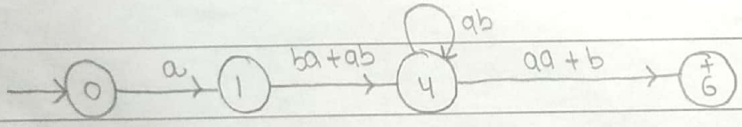
QUESTION 2:

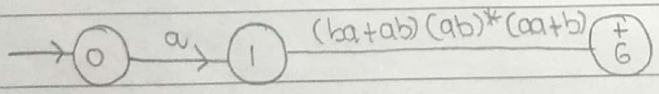


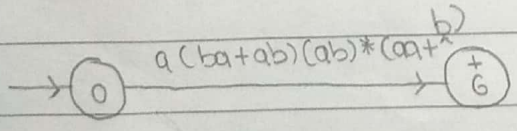












Resulting RE: a(ba+ab)(ab)*(aa+b)

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QUESTION 3:

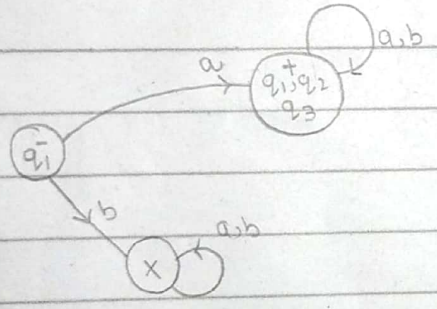
Step 1: For every state in the ENFA, determine all reachable states for every input symbol.

	δ	$\delta(\delta, a)$	$\delta(\delta, b)$
-	q_1	$\{q_1, q_2, q_3\}$	ϕ
+	q_2	$\{q_2, q_3\}$	$\{q_1, q_2, q_3\}$
	q_3	$\{q_1, q_2\}$	ϕ

Step 2: The set of reachable states constitutes a single state in the converted DFA. Now find reachable states for each new DFA state, until no more new states could be found.

	δ	$\delta(\delta, a)$	$\delta(\delta, b)$
-	q_1	$\{q_1, q_2, q_3\}$	ϕ
+	$\{q_1, q_2, q_3\}$	$\{q_1, q_2, q_3\}$	$\{q_1, q_2, q_3\}$
	ϕ	ϕ	ϕ

Step 3: Draw the resulting DFA



QUESTION 4:

Step 1: For every state in the ENFA, determine all reachable states for every input signal.

	δ	$\delta(\delta, a)$	$\delta(\delta, b)$	$\delta(\delta, c)$
-	P	$\{P, r\}$	$\{q, r\}$	$\{P, q, r\}$
	q	$\{P, q, r\}$	$\{r\}$	$\{P, q, r\}$
+	r	ϕ	ϕ	ϕ

Step 2: The set of reactable states constitutes a single state in the converted DFA. Now find reachable states for each new DFA state, until no more new states could be found.

	δ	$\delta(\delta, a)$	$\delta(\delta, b)$	$\delta(\delta, c)$
-	P	$\{P, r\}$	$\{q, r\}$	$\{P, q, r\}$

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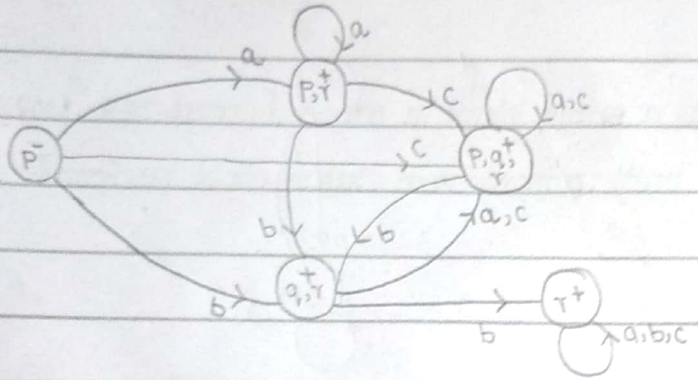
+ $\{p,r\}$	$\{p,r\}$	$\{q,r\}$	$\{p,q,r\}$
+ $\{q,r\}$	$\{p,q,r\}$	$\{r\}$	$\{p,q,r\}$
+ $\{p,q,r\}$	$\{p,q,r\}$	$\{q,r\}$	$\{p,q,r\}$
+ $\{r\}$	ϕ	ϕ	ϕ
ϕ	ϕ	ϕ	ϕ

Step 3: Draw the resulting DFA.



QUESTION 5:

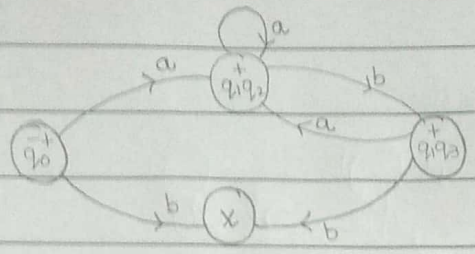
Step 1: For every step in the NFA, determine all reactable states for every input signal.

δ	$\delta(\delta,a)$	$\delta(\delta,b)$
→ q_0	$\{q_1,q_2\}$	ϕ
+ q_1	$\{q_1,q_2\}$	ϕ
q_2	ϕ	$\{q_1,q_3\}$
q_3	$\{q_1,q_2\}$	ϕ

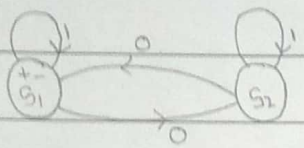
Step 2: The set of reactable states constitutes a single state in the converted DFA. Now find reactable states for every new DFA state, until no more new states could be found.

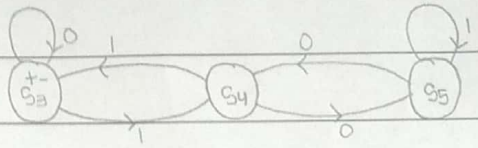
δ	$\delta(\delta,a)$	$\delta(\delta,b)$
→ q_0	$\{q_1,q_2\}$	ϕ
+ $\{q_1,q_2\}$	$\{q_1,q_2\}$	$\{q_1,q_3\}$
ϕ	ϕ	ϕ
+ $\{q_1,q_3\}$	$\{q_1,q_2\}$	ϕ

Step 3: Draw the resulting DFA



QUESTION 6:



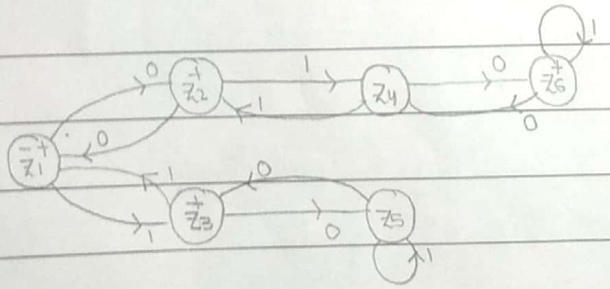


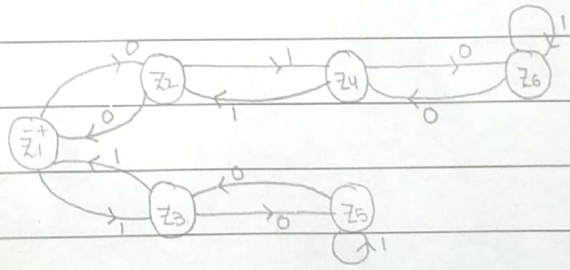
2- Union:

	0	1
$-+$ $Z_1 \equiv (S_1, S_3)$	$(S_2, S_3) \equiv Z_2$	$(S_1, S_4) \equiv Z_3$
$+$ $Z_2 \equiv (S_2, S_3)$	$(S_1, S_3) \equiv Z_1$	$(S_2, S_4) \equiv Z_4$
$+$ $Z_3 \equiv (S_1, S_4)$	$(S_2, S_5) \equiv Z_5$	$(S_1, S_3) \equiv Z_1$
$Z_4 \equiv (S_2, S_4)$	$(S_1, S_5) \equiv Z_6$	$(S_2, S_3) \equiv Z_2$
$Z_5 \equiv (S_2, S_5)$	$(S_1, S_4) \equiv Z_3$	$(S_2, S_5) \equiv Z_5$
$+$ $Z_6 \equiv (S_1, S_5)$	$(S_2, S_4) \equiv Z_4$	$(S_1, S_5) \equiv Z_6$

3- Intersection:

	0	1
$-+$ $Z_1 \equiv (S_1, S_3)$	$(S_2, S_3) \equiv Z_2$	$(S_1, S_4) \equiv Z_3$
$Z_2 \equiv (S_2, S_3)$	$(S_1, S_3) \equiv Z_1$	$(S_2, S_4) \equiv Z_4$
$Z_3 \equiv (S_1, S_4)$	$(S_2, S_5) \equiv Z_5$	$(S_1, S_3) \equiv Z_1$
$Z_4 \equiv (S_2, S_4)$	$(S_1, S_5) \equiv Z_6$	$(S_2, S_3) \equiv Z_2$
$Z_5 \equiv (S_2, S_5)$	$(S_1, S_4) \equiv Z_3$	$(S_2, S_5) \equiv Z_5$
$Z_6 \equiv (S_1, S_5)$	$(S_2, S_4) \equiv Z_4$	$(S_1, S_5) \equiv Z_6$

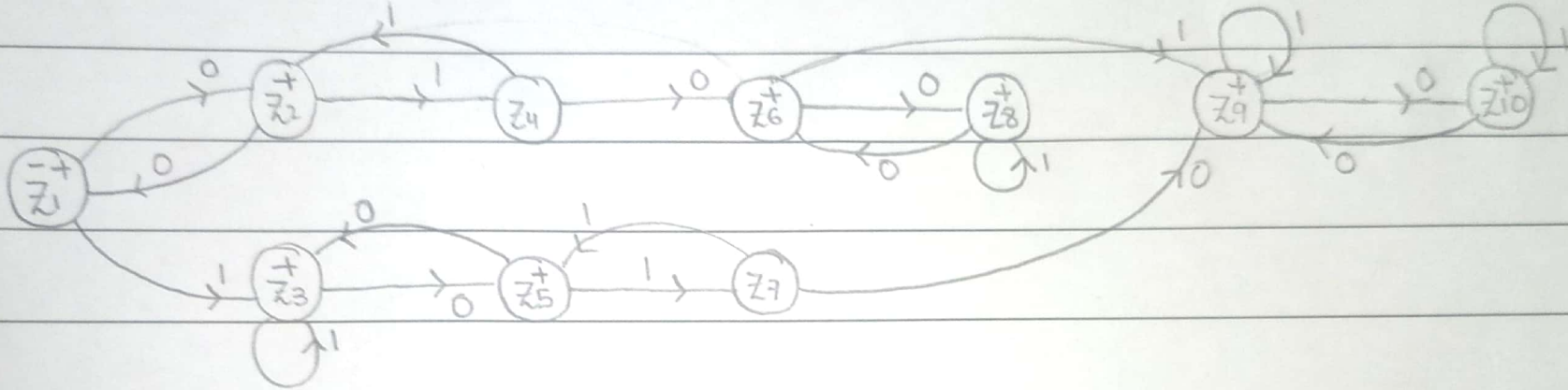




1- Concatenation:

	0	1
$-+$ $Z_1 \equiv (S_1, S_3)$	$(S_2, S_3) \equiv Z_2$	$(S_1, S_3, S_4) \equiv Z_3$
$+$ $Z_2 \equiv (S_2, S_3)$	$(S_1, S_3) \equiv Z_1$	$(S_2, S_4) \equiv Z_4$
$+$ $Z_3 \equiv (S_1, S_3, S_4)$	$(S_2, S_3, S_5) \equiv Z_5$	$(S_1, S_3, S_4) \equiv Z_3$
$Z_4 \equiv (S_2, S_4)$	$(S_1, S_3, S_5) \equiv Z_6$	$(S_2, S_3) \equiv Z_2$
$+$ $Z_5 \equiv (S_2, S_3, S_5)$	$(S_1, S_3, S_4) \equiv Z_3$	$(S_2, S_4, S_5) \equiv Z_7$
$+$ $Z_6 \equiv (S_1, S_3, S_5)$	$(S_2, S_3, S_4) \equiv Z_8$	$(S_1, S_3, S_4, S_5) \equiv Z_9$
$Z_7 \equiv (S_2, S_4, S_5)$	$(S_1, S_3, S_5, S_4) \equiv Z_9$	$(S_2, S_3, S_5) \equiv Z_5$
$+$ $Z_8 \equiv (S_1, S_3, S_4)$	$(S_1, S_3, S_5) \equiv Z_6$	$(S_2, S_4, S_3) \equiv Z_8$
$+$ $Z_9 \equiv (S_1, S_3, S_4, S_5)$	$(S_2, S_3, S_5, S_4) \equiv Z_{10}$	$(S_1, S_3, S_4, S_5) \equiv Z_9$

$Z_{10} \equiv (S_2, S_3, S_5, S_4)$ $(S_1, S_3, S_4, S_5) \equiv Z_9$ $(S_2, S_4, S_5, S_3) \equiv Z_{10}$



4- Closure

	0	1
$Z_1 \equiv S_1$	$S_2 \equiv Z_2$	$S_1 \equiv Z_1$
$Z_2 \equiv S_2$	$S_1 \equiv Z_1$	$S_2 \equiv Z_2$