lecture 10:- Kleene theorem III.

"For each regex there is a Corresponding FA"

$\underbrace{(r_1+r_2)^+}_{FA_1} \; \underbrace{r_1 r_2^*}_{FA_2} \; \underbrace{(r_1+r_3)^*}_{FA_3}$ - - - - -

Three issues in Combining.

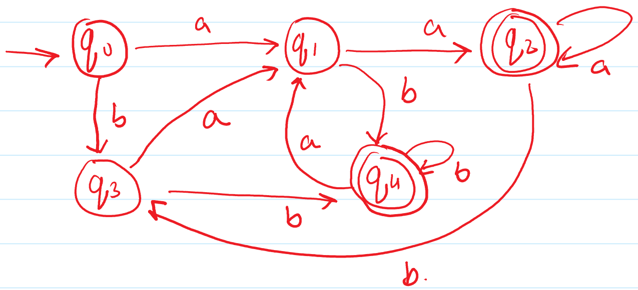
1- Sum, Union, +
2- Concatenation.
3- Closure. *.

Closure:- → During processing Any ~~state~~ state encountered final the resultant state will also be final.

→ The final state will always be written together with Initial.

→ The Initial for the first time will also be marked as final.

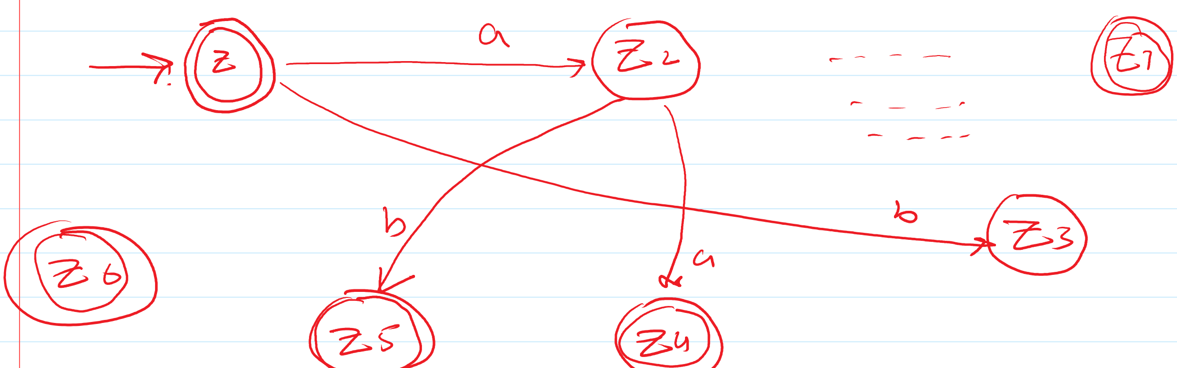
Ex:-



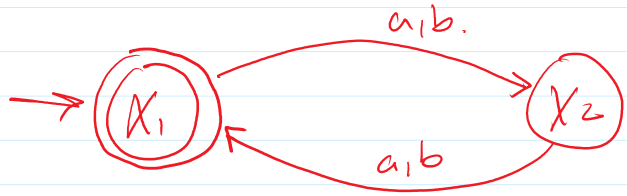
$(r_1^* + r_2 + r_4 r_5)^*$

old state	Transition at 'a'	Transition at 'b'.
$^{+}Z_1^{-} \equiv q_0$	$Z_2 \equiv q_1$	$Z_3 \equiv q_3$
$Z_2 \equiv q_1$	$Z_4^+ \equiv (q_2, q_0)$	$Z_5^+ \equiv (q_4, q_0)$
$Z_3 \equiv q_3$	$Z_2 \equiv q_1$	$Z_5^+ \equiv (q_4, q_0)$
$Z_4^+ \equiv (q_2, q_0)$	$Z_6^+ \equiv (q_2, q_0, q_1)$	$Z_3 \equiv (q_3, \cancel{q_3})$
$Z_5^+ \equiv (q_4, q_0)$.	$Z_2 \equiv (q_1, \cancel{q_1})$	$Z_7^+ \equiv (q_4, q_0, q_3)$
$Z_6^+ \equiv (q_2, q_0, q_1)$	$Z_6^+ \equiv (q_2, q_0, q_1, \cancel{q_2}, \cancel{q_0})$	$Z_7^+ \equiv (q_3, \cancel{q_3}, q_4, q_0)$
$Z_7^+ = (q_4, q_0, q_3)$.	$Z_2 \equiv (q_1, \cancel{q_1}, \cancel{q_1})$	$Z_7^+ \equiv (q_4, q_0, q_3, \cancel{q_4}, \cancel{q_0})$

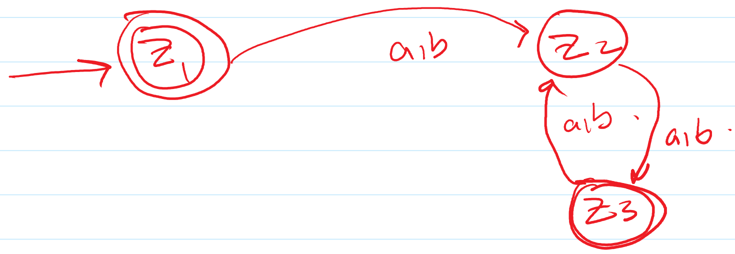
$(q_3, q_4, q_0) = (q_4, q_0, q_3) \equiv Z_7$

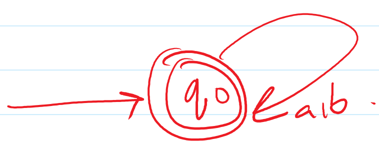


H.W.

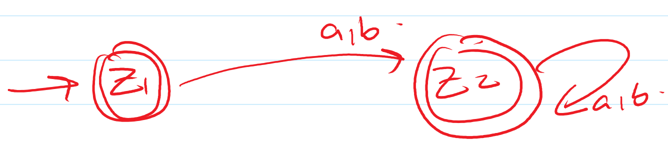


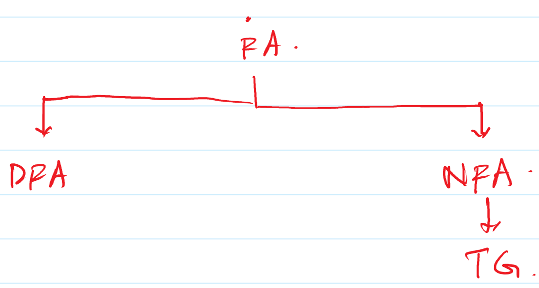
old State	transition at 'a'	transition at 'b'.
$^{+}Z_1^{-} \equiv X_1$	$Z_2 \equiv X_2$	$Z_2 \equiv X_2$
$Z_2 \equiv X_2$	$Z_3^{+} \equiv (X_1, \cancel{X_1})$	$Z_3^{+} \equiv X_1$
$Z_3^{+} \equiv X_1$	$Z_2 \equiv X_2$	$Z_2 \equiv X_2$

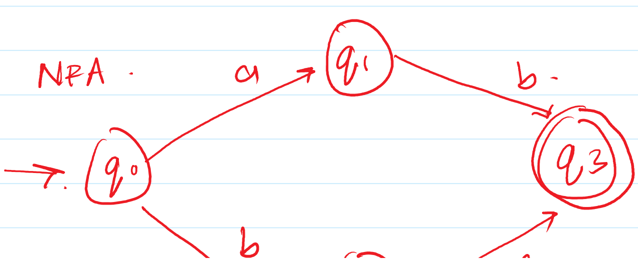


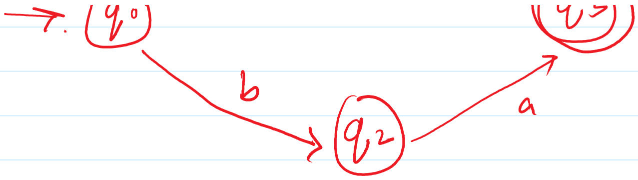


old State	Transition at 'a'	Transition at 'b'.
$\bar{Z}_1^{+} \equiv q_0$	$Z_2^{+} \equiv (q_0, \cancel{q_0})$	$Z_2^{+} \equiv (q_0, \cancel{q_0})$
$Z_2^{+} \equiv q_0$	$Z_2^{+} \equiv (q_0, \cancel{q_0})$	$Z_2^{+} \equiv (q_0, \cancel{q_0})$

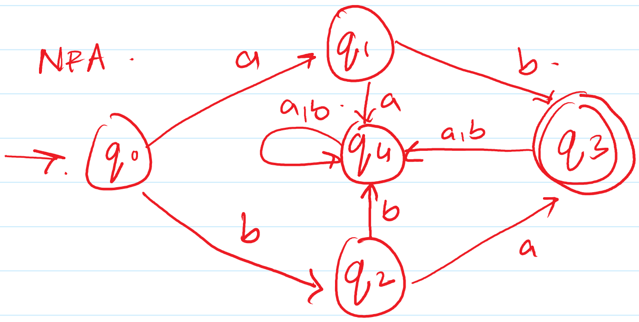


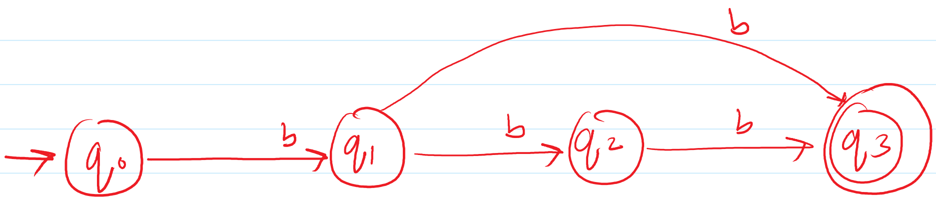




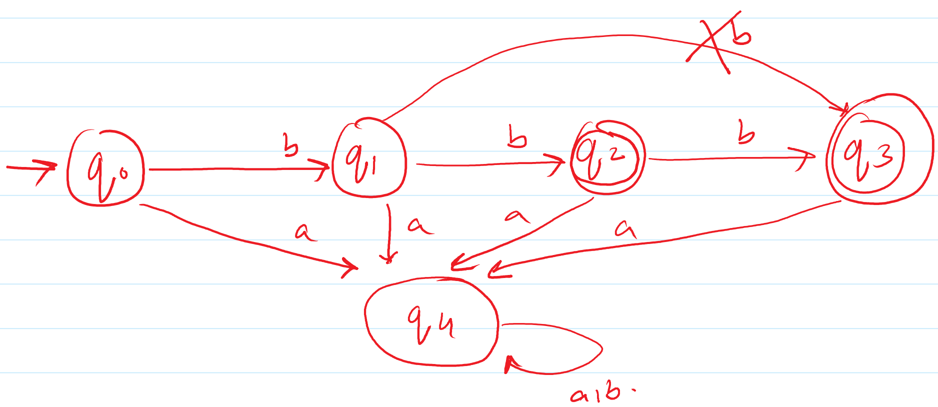

q0
b
q2
a
q3

NFA.


a
q1
b
a,b
a
q0
q4
a,b
q3
b
b
q2
a


b
q0
b
q1
b
q2
b
q3

NFA.


b
q0
b
q1
b
q2
b
q3
a
a
a
a
q4
a,b