lecture 8:-

Kleene Theorem

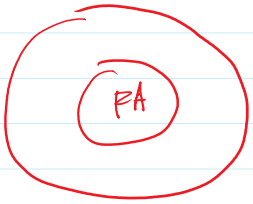
if A language can be expressed by.

1- FA or
2- TG or
3- RE.

then it can be expressed using the other three forms.

RE → FA → TG

PART 1:- Every language that can be expressed using FA can also Expressed using TG.

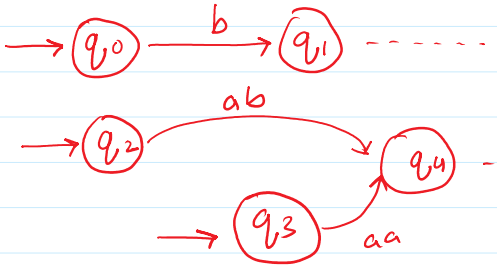


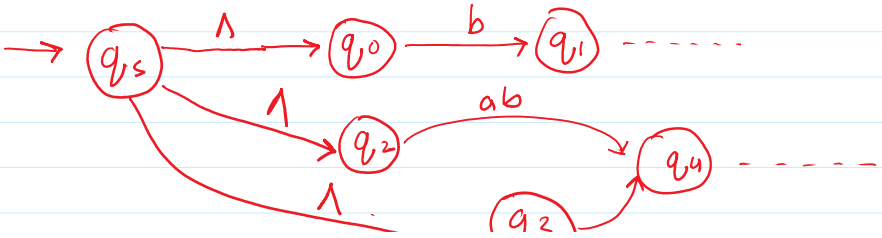
Nothing to proof since every FA is a TG.

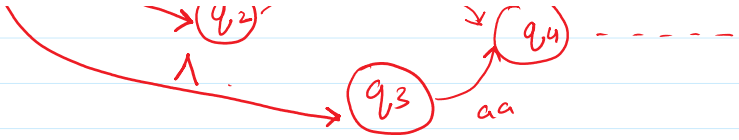
PART 2:- Every language that can be expressed using TG can also be Expressed using RE.

CONSTRUCTIVE ALGO:-

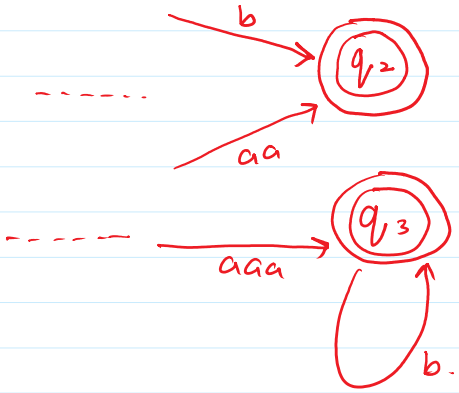
STEP 1:- Create a Unique Start State.

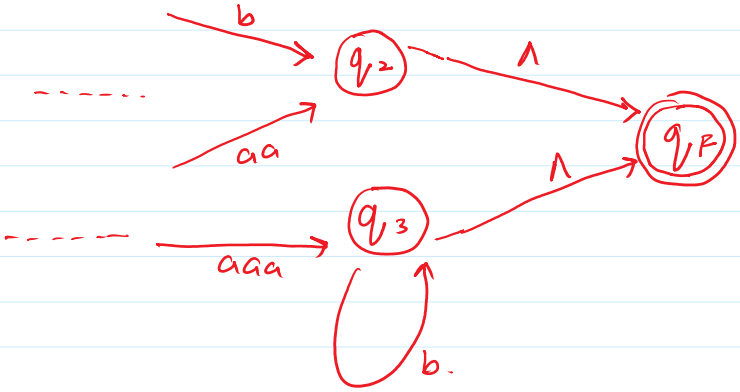




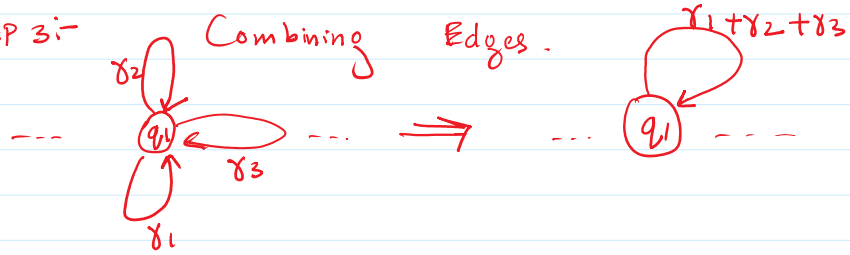


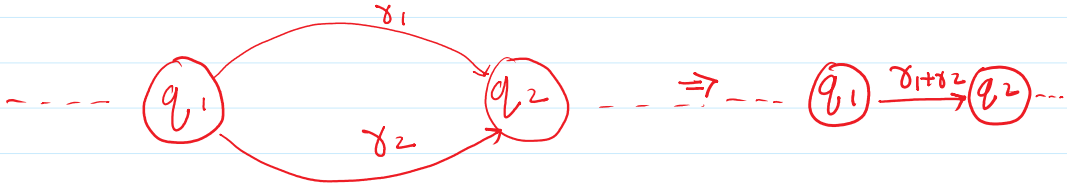
STEP 2:- Create a Unique final State.



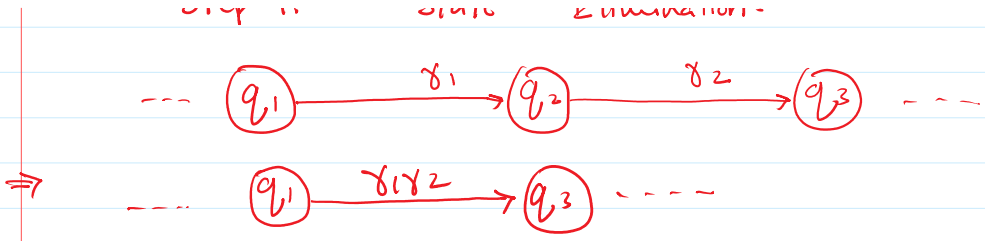


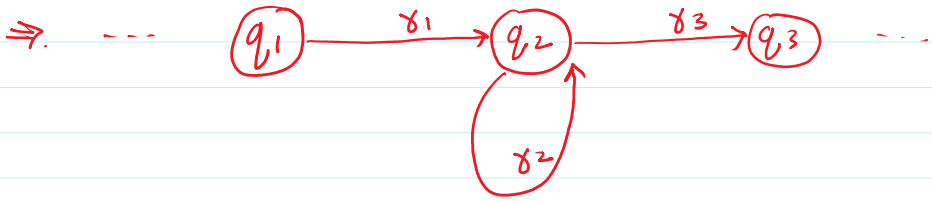
STEP 3:- Combining Edges.

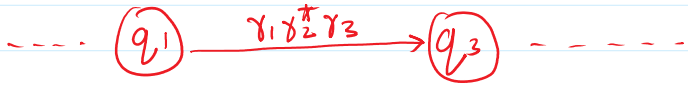


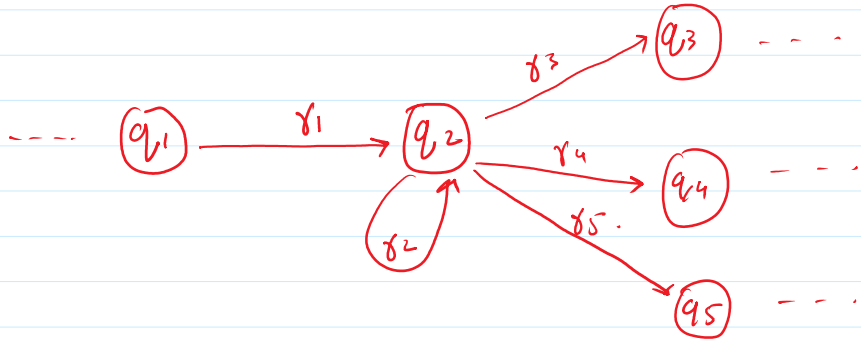


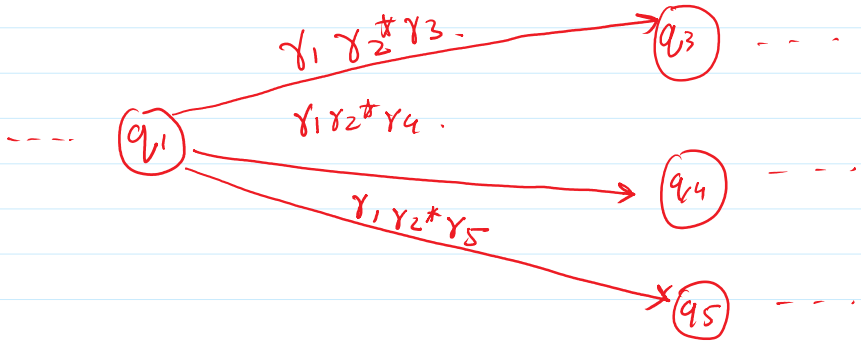
Step 4:- State Elimination.

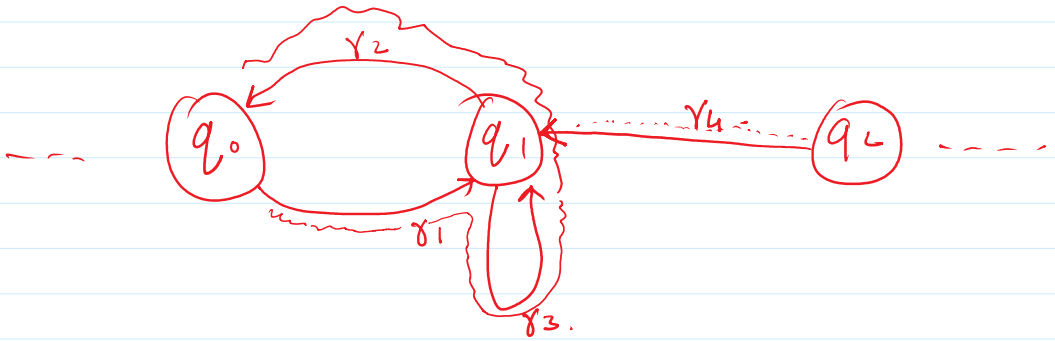




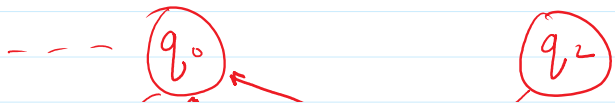


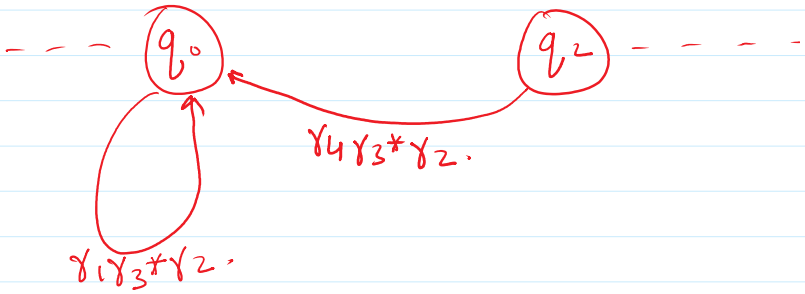




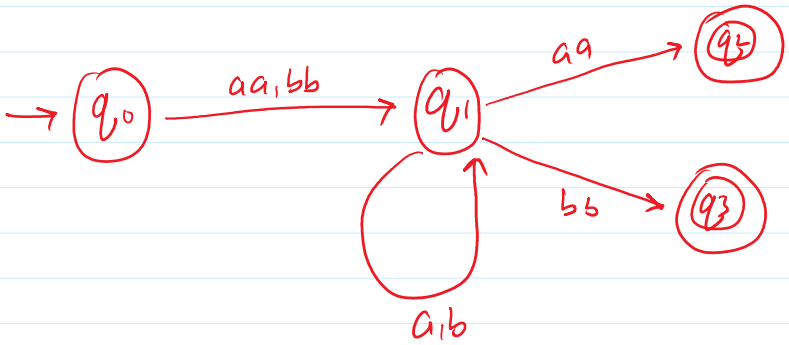


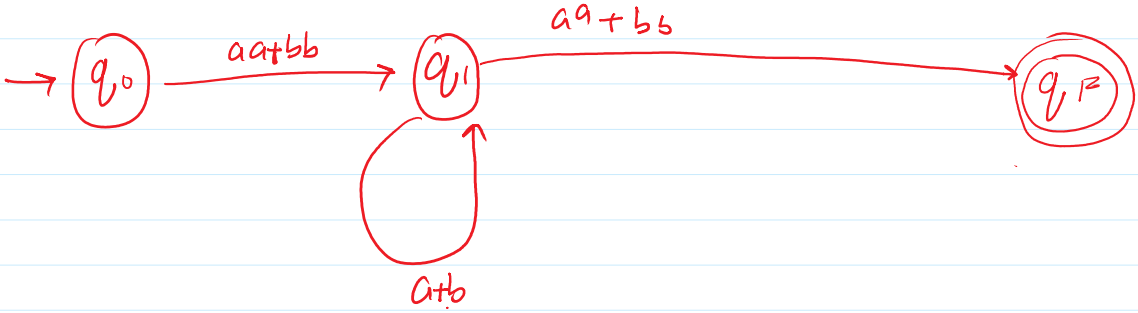
$\gamma_2\gamma_4^* \neq \gamma_4^*\gamma_2$.

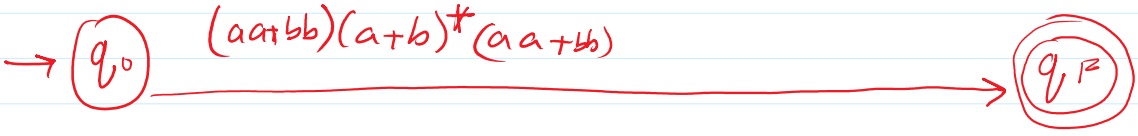



q_0
q_2
$r_4 r_3^* r_2$.
$r_1 r_3^* r_2$.

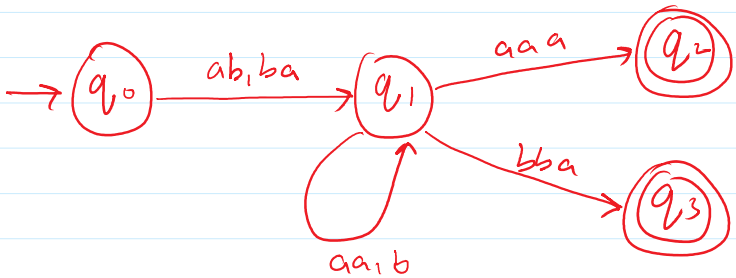
Ex:-


q_0
aa, bb
q_1
aa
q_2
bb
q_3
a, b

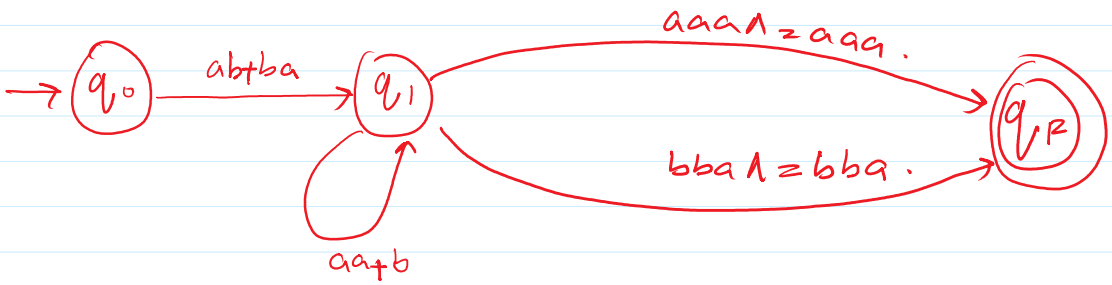

q_0
aa+bb
q_1
aa+bb
q_{12}
a+b

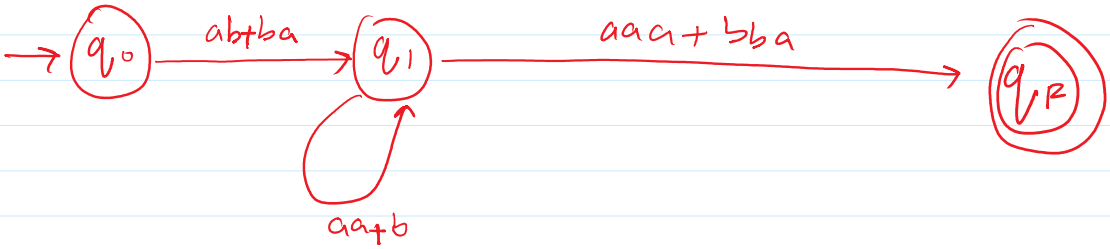

q_0
(aa+bb)(a+b)*(aa+bb)
q_{12}

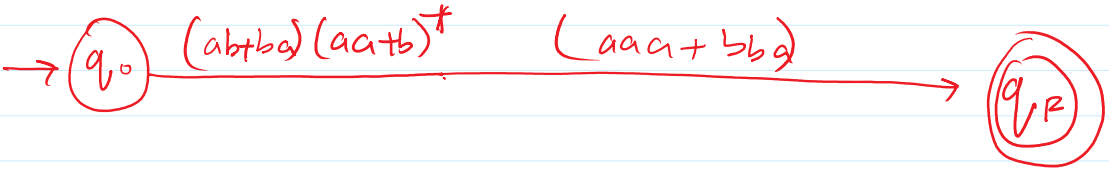
Ex 2:-


q_0
ab, ba
q_1
aaa
q_2
bba
q_3
aa, b

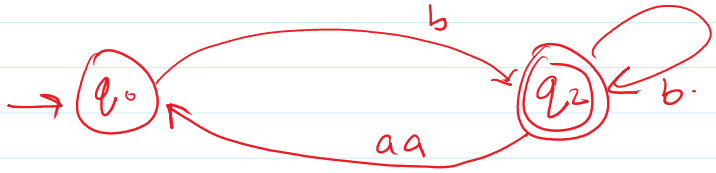
abtba
aaa∧=aaa.

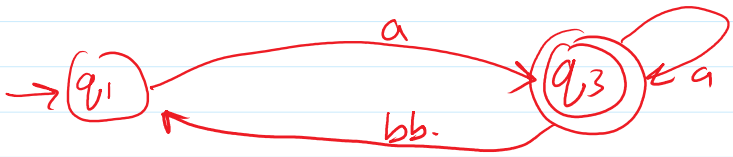

q_0
ab+ba
q_1
aaa∧ = aaa.
bba∧ = bba.
q_F
aa+b

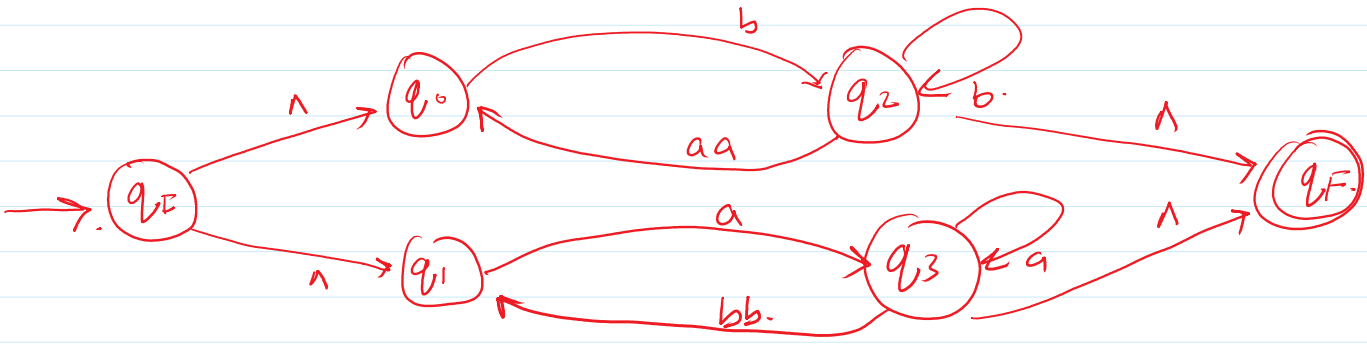

q_0
ab+ba
q_1
aaa+bba
q_F
aa+b

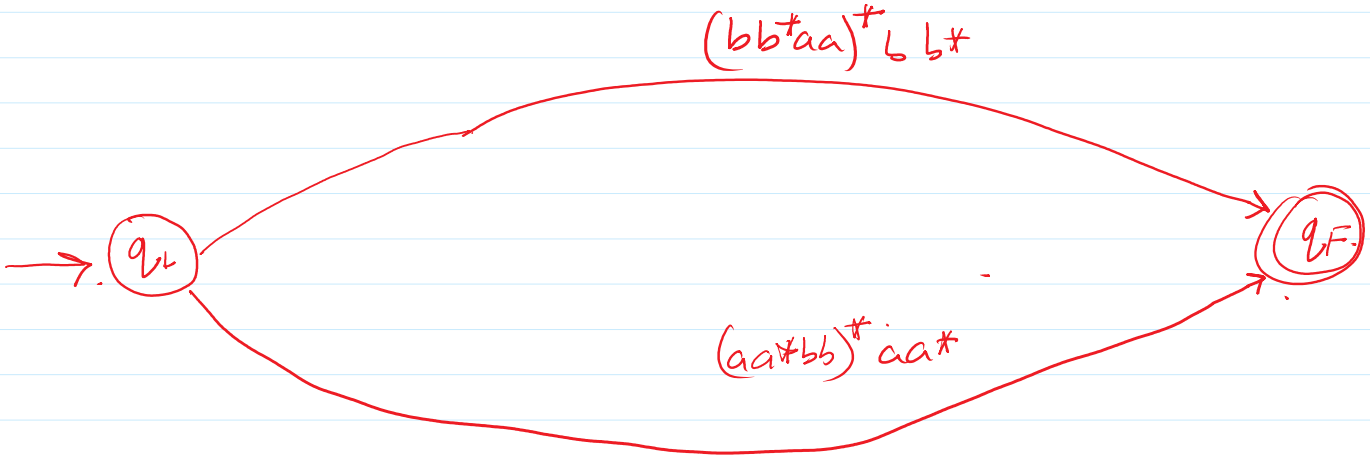

q_0
(ab+ba)(aa+b)*
(aaa+bba)
q_F

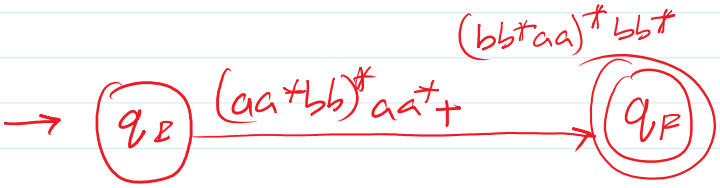
Ex3:-


q_0
b
q_2
b.
aa

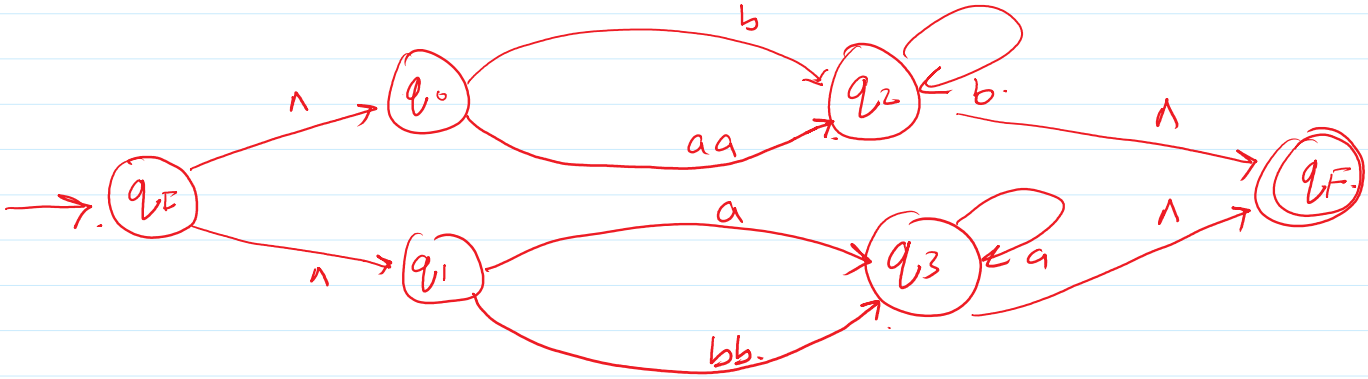

q_1
a
q_3
a
bb.


q_I
∧
q_0
b
q_2
b.
aa
∧
q_F
∧
q_1
a
q_3
a
bb.
∧



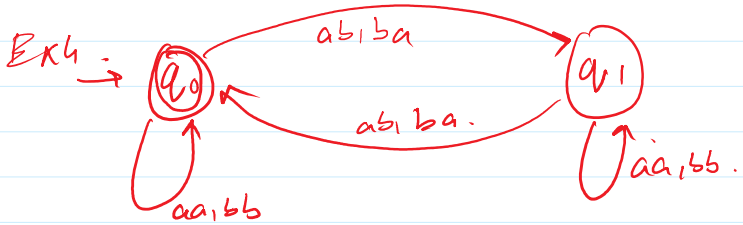


Ex.

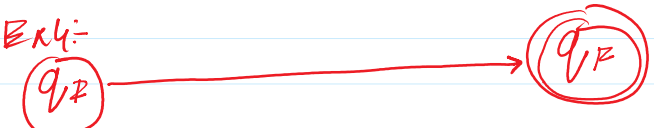


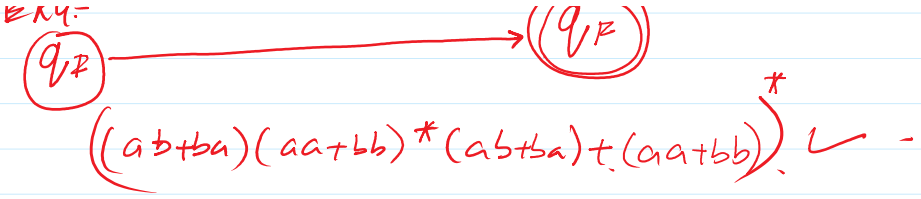
$(a+bb)a^* + (b+aa)b^*$

Ex4 :



Ex4:-





Ex4:

$q_F \longrightarrow (q_F)$

$((ab+ba)(aa+bb)^*(ab+ba)+(aa+bb))^*$