ⓟ DFA to R.E
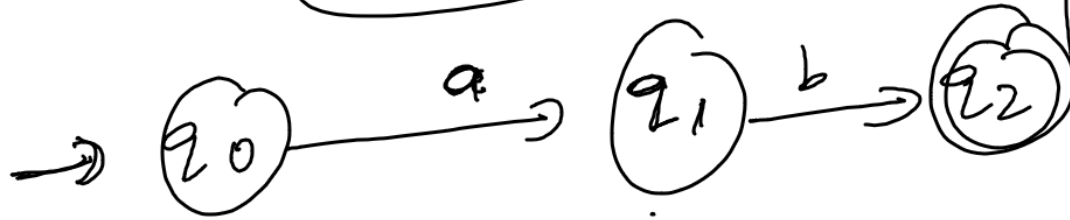
$$a, b, +, *, .$$

Step 1:- Equations

$$q_0 = \boxed{\epsilon}$$

$$q_1 = q_0 a$$

$$q_2 = q_1 b$$

$$q_2 = (q_0 a) b$$

$$q_2 = q_0 a b$$

$$\boxed{q_2 = \epsilon a b}$$
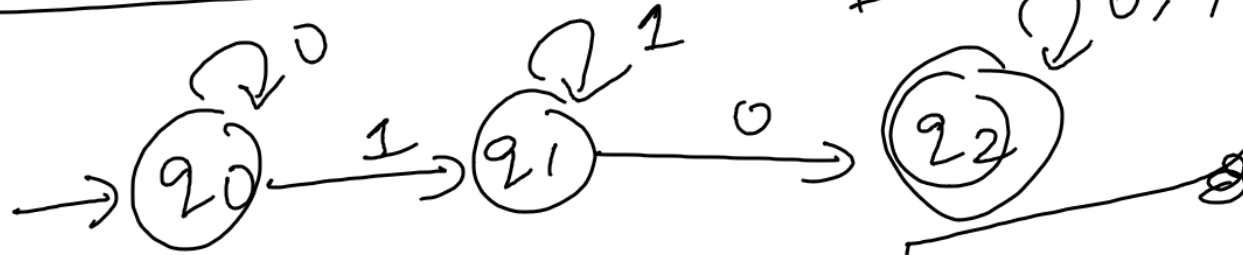
$$\epsilon R = R \epsilon = \underline{R}$$

$$\boxed{q_2 = a b}$$

$$R = \varphi + RP$$
$$R = \varphi P^{a}$$

$$q_2 = q_1 0 + q_2(0+1)$$
$$R = (\varphi) + R \; P$$

$$q_0 = \epsilon + 0 q_0$$

$$q_1 = 1 q_0 + 1 q_1$$

$$q_2 = 0 q_1 + 0 q_2 + 1 q_2$$

$$q_2 = q_1 0 (0+1)^{a}$$

$$q_1 = q_0 1 + q_1 1$$
$$q_1 = q_0 1 (1)^{a}$$
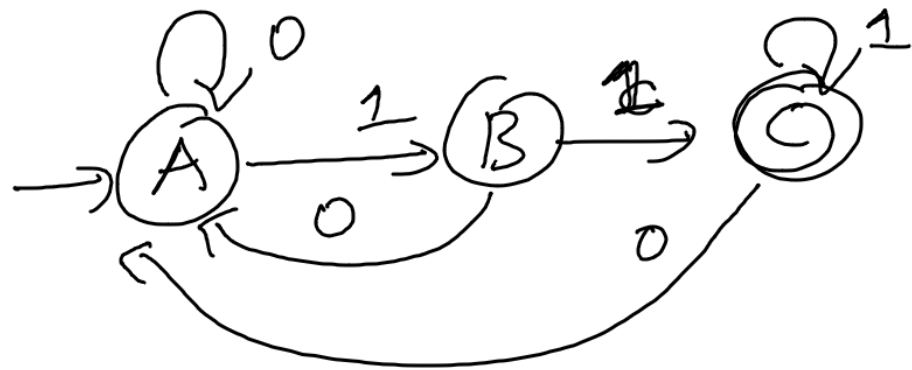$$q_0 = \epsilon + q_0 0$$
$$q_0 = \epsilon (0)^{a}$$

$$q_0 = 0^*$$

$$q_1 = q_0 1 1^*$$

$$q_1 = 0^* 1 1^*$$

$$q_2 = (0^* 1 1^*) 0 (0+1)^*$$

$$A = \epsilon + A0 + B0 + C0$$

$$B = A1$$

$$C = B1 + C1$$

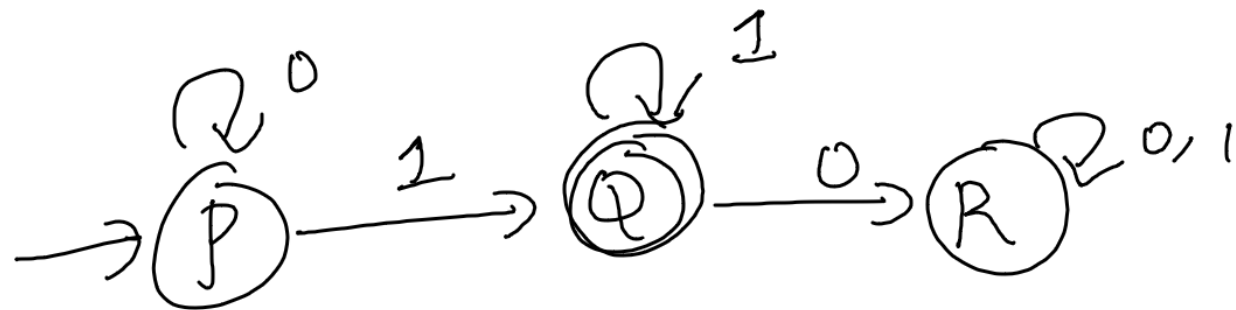$$\boxed{C = B 1 1^*}$$

$$C = A 1 1 1^*$$

$$A = \epsilon + A0 + B0 + C0$$

$$A = \epsilon + A0 + A10 + A1110$$

$$A = \epsilon + A(0 + 10 + 1110)$$

$$A = \epsilon(0 + 10 + 1110)^*$$

$$A = (0 + 10 + 1110)^*$$

$$C = (0 + 10 + 1110)^* 111$$

Finite automaton diagram with states P, Q (accepting), and R:
- Start arrow into P
- P has a self-loop labeled 0
- $P \xrightarrow{1} Q$
- Q has a self-loop labeled 1
- $Q \xrightarrow{0} R$
- R has a self-loop labeled $0,1$

$$P = \epsilon + P0$$
$$Q = P1 + Q1$$
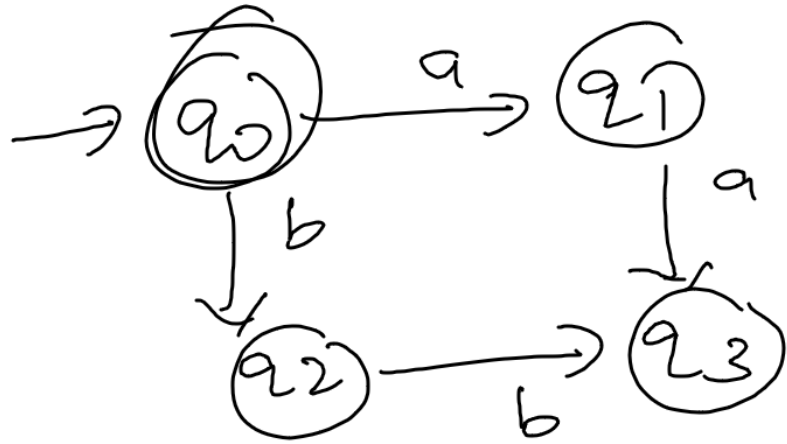$$\times R = Q0 + R0 + R1$$

$$Q = P1 + Q1$$
$$Q = P11$$

$$P = \epsilon + P0$$
$$P = \epsilon 0$$
$$P = 0$$

$$Q = 0\,11$$

Equivalence of two DFAS.

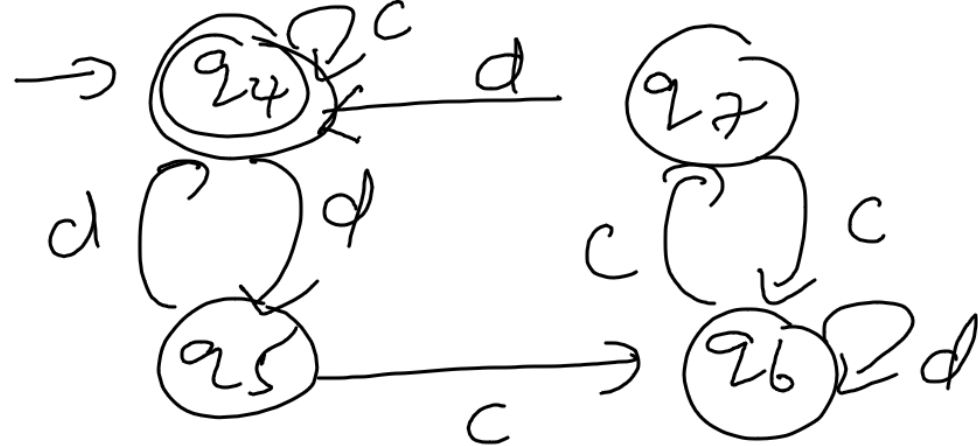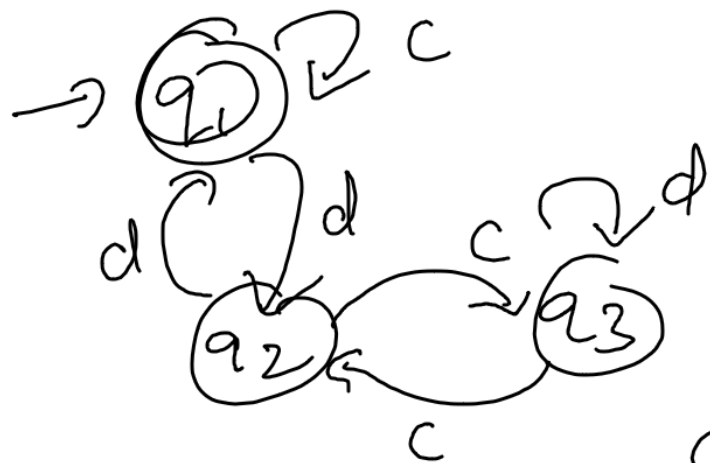Step 1:- DFA1 start state is final state

DFA2 start state must be final s

	0	1
→A	B	D
(B)	A	C
D	D	B
C	C	A

B, D

	0	1
→P	R	R
Q	R	P
(R)	P	Q
/////	/////	/////

R

	0	1	
A/P	B/R	D/R	✓
B/R	A/P	C/Q	✓
D/R	C/P	A/Q	✓
C/Q	D/R	B/P	✗

(q_1, q_4)

	c	d
q_1, q_4	q_1, q_4 x	q_2, q_5 x
q_2, q_5	q_3, q_6 x	q_1, q_4 x
q_3, q_6	q_2, q_7 x	q_3, q_6 x
q_2, q_7	q_3, q_6 x	q_1, q_4 x