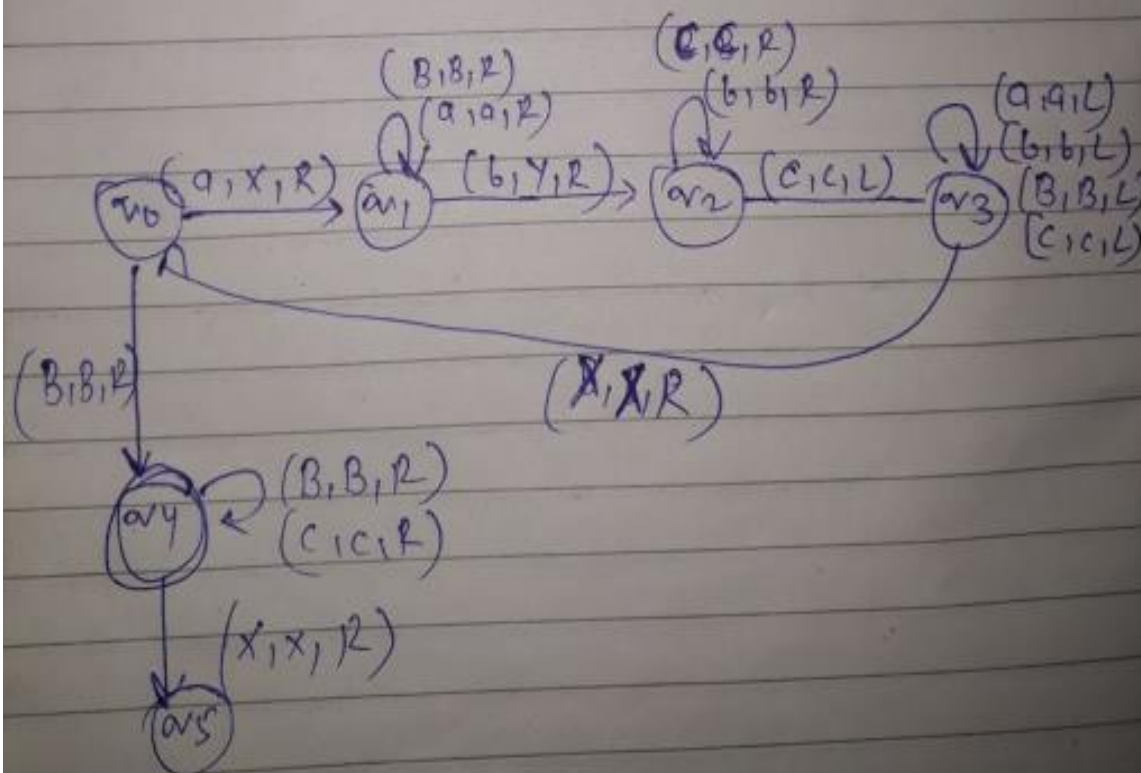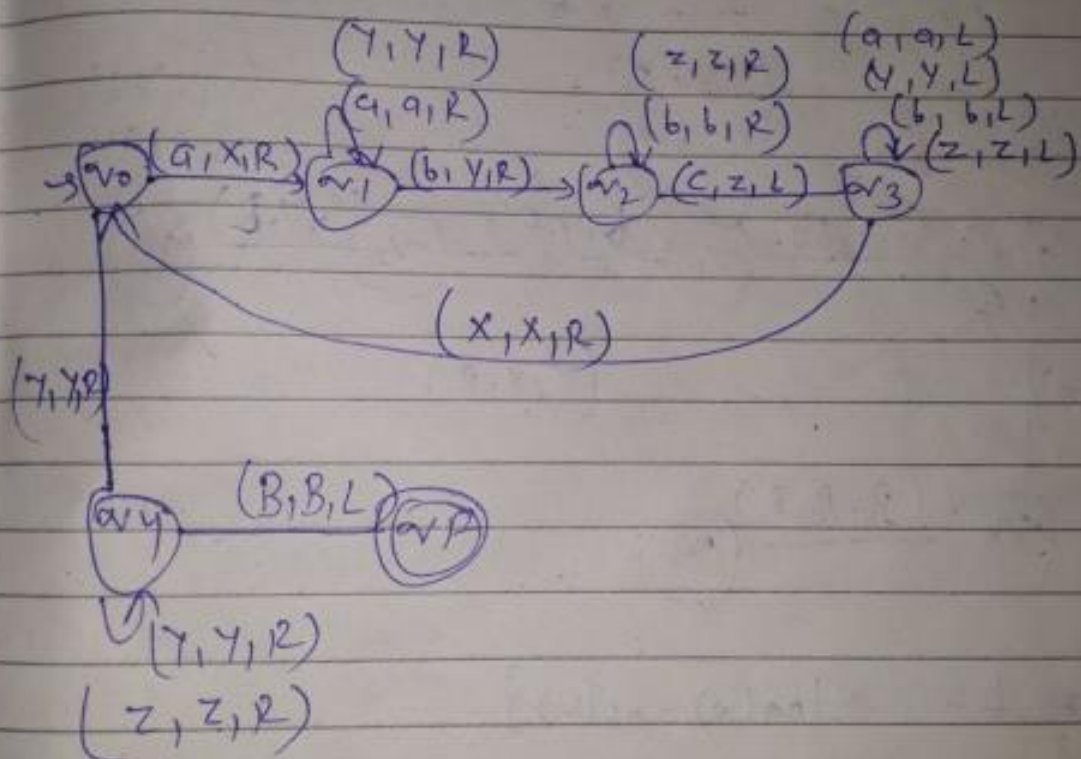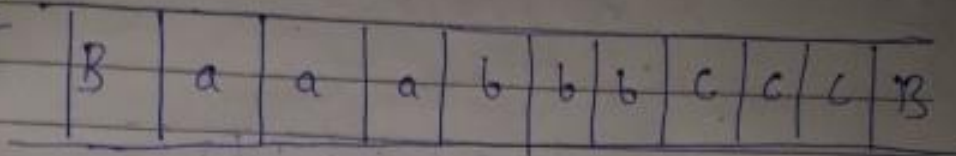# TUTORIAL-10

1) Construct TMs to accept the following language over $\Sigma = \{a,b\}$

a) The Set of Strings with even length!

b) $L = \{a^n b^n c^n, n \geq 1\}$

Solve =

B	a	a	a	b	b	b	c	c	c	B

(Y, Y, R)
(a, a, R)

(z, z, R)
(b, b, R)

(a, a, L)
(N, Y, L)
(b, b, L)
(z, z, L)

$\rightarrow (v_0) \xrightarrow{(a, X, R)} (v_1) \xrightarrow{(b, Y, R)} (v_2) \xrightarrow{(c, z, L)} (v_3)$

(x, x, R)

(Y, Y, R)

$(v_4) \xrightarrow{(B, B, L)} (v_f)$

(Y, Y, R)
(z, z, R)

(c) $L = a^n b^{2n}$, $n \geq 1$

<u>Solve</u>

$n = 1, 2, 3 \cdots$

$n = 2$

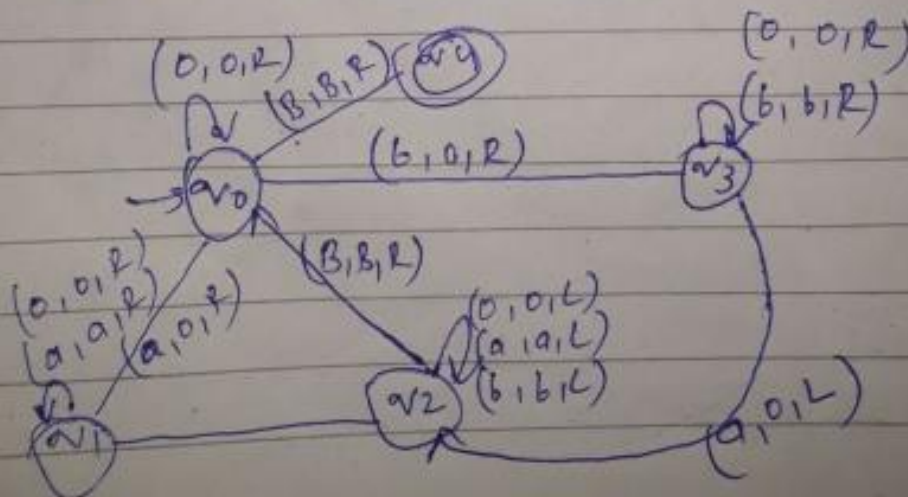| B	a	a	b	b	b	b	B

Consider two b with one a

d) $L = \{ w \mid n_a(w) = n_b(w) \}$

(e) $L = \{ ww^R \mid w \in \{a, b\}^* \}$

(X, X, R)
(Y, Y, R)

(b, b, L)
(a, a, L)

(Y, Y, L)
(X, X, L)
(B, B, L)

q_1

q_4

(a, X, R)

q_0

(a, X, L)

q_3

(X, X, R)
(Y, Y, R)

(b, Y, R)

q_2

(b, Y, L)

(Y, Y, L)
(X, X, L)
(B, B, L)

q_5

(b, b, L)
(a, a, L)

(X, X, R)
(Y, Y, R)

q_6

(B, B, L)

(X, X, R)
(Y, Y, R)

q_F