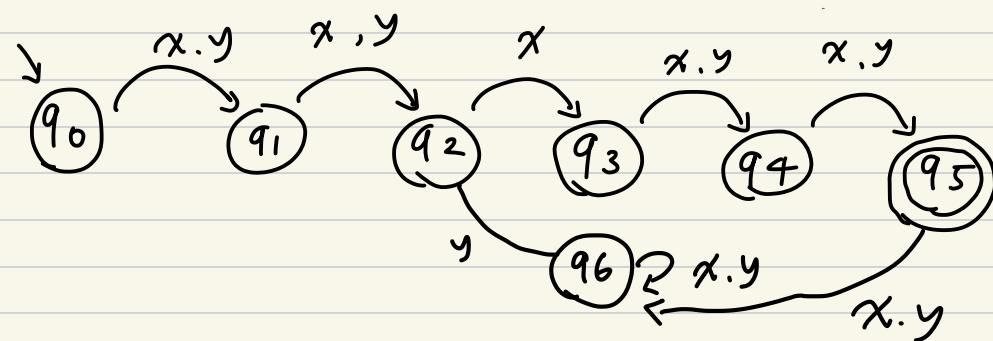
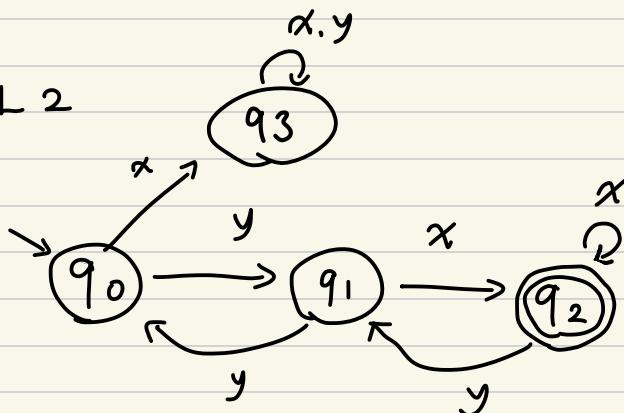


Assignment 1

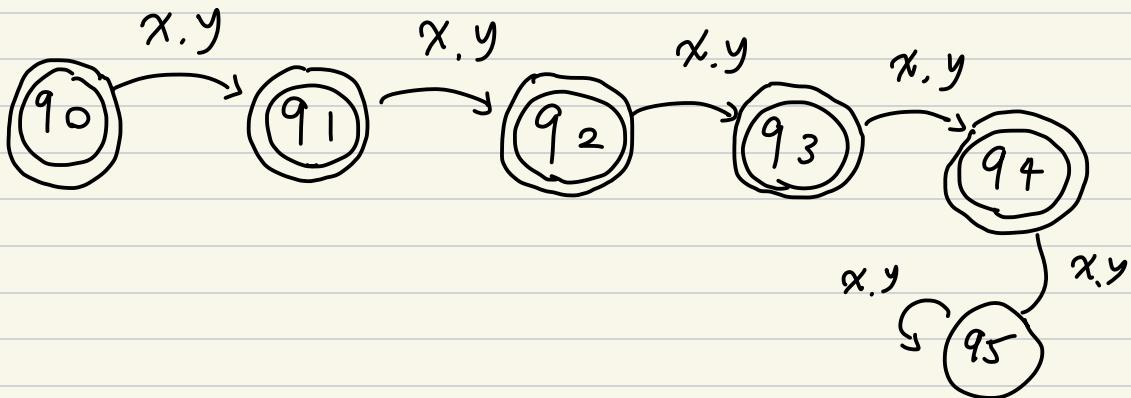
a. L₁



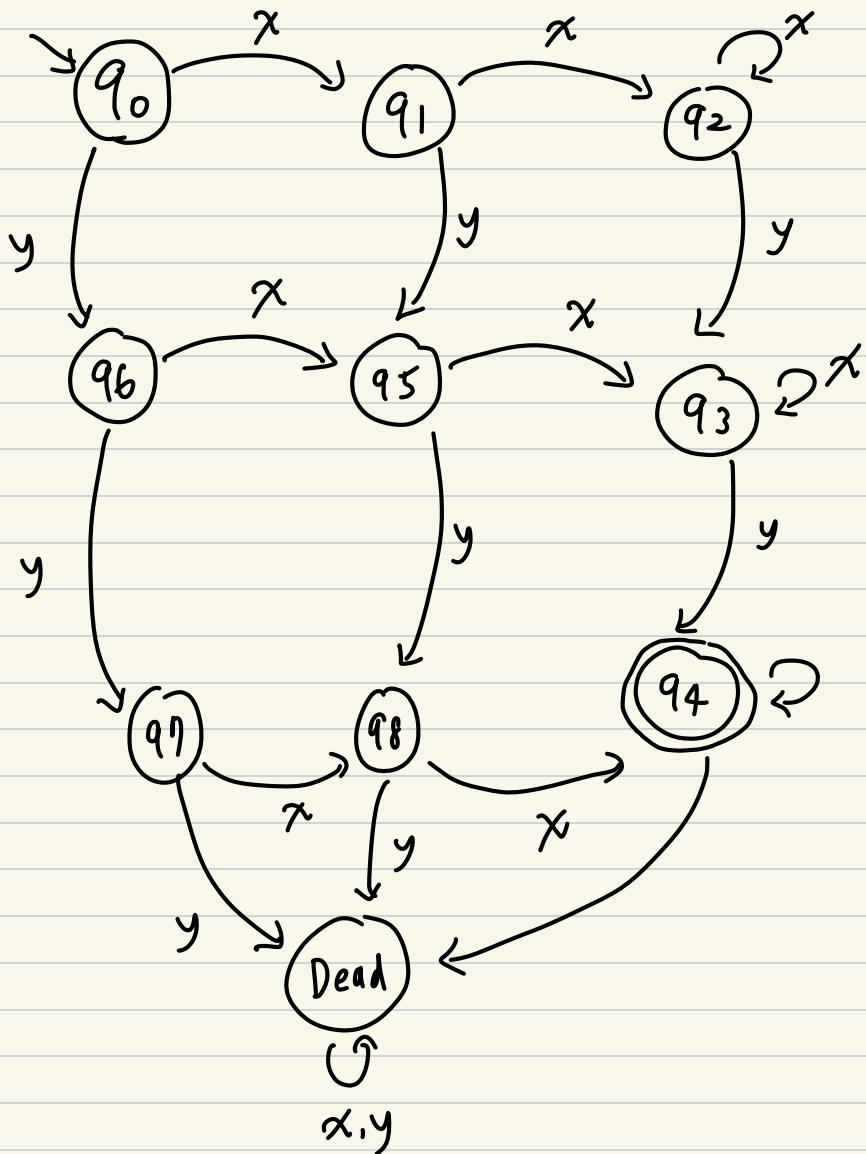
L₂



L₃



L 4



b) The formal definition of L2

$$Q = \{ q_0, q_1, q_2 \}$$

$$\Sigma = \{ x, y \}$$

$$\delta(q_0, x) = q_3 \quad \delta(q_0, y) = q_1$$

$$\delta(q_1, x) = q_2 \quad \delta(q_1, y) = q_0$$

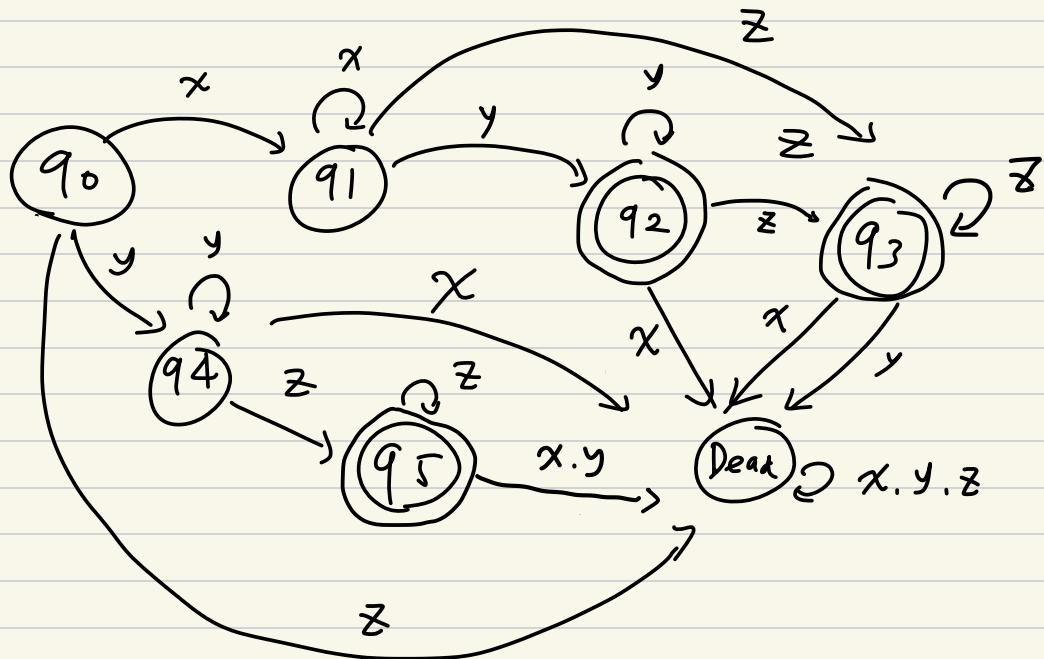
$$\delta(q_2, x) = q_2 \quad \delta(q_2, y) = q_1$$

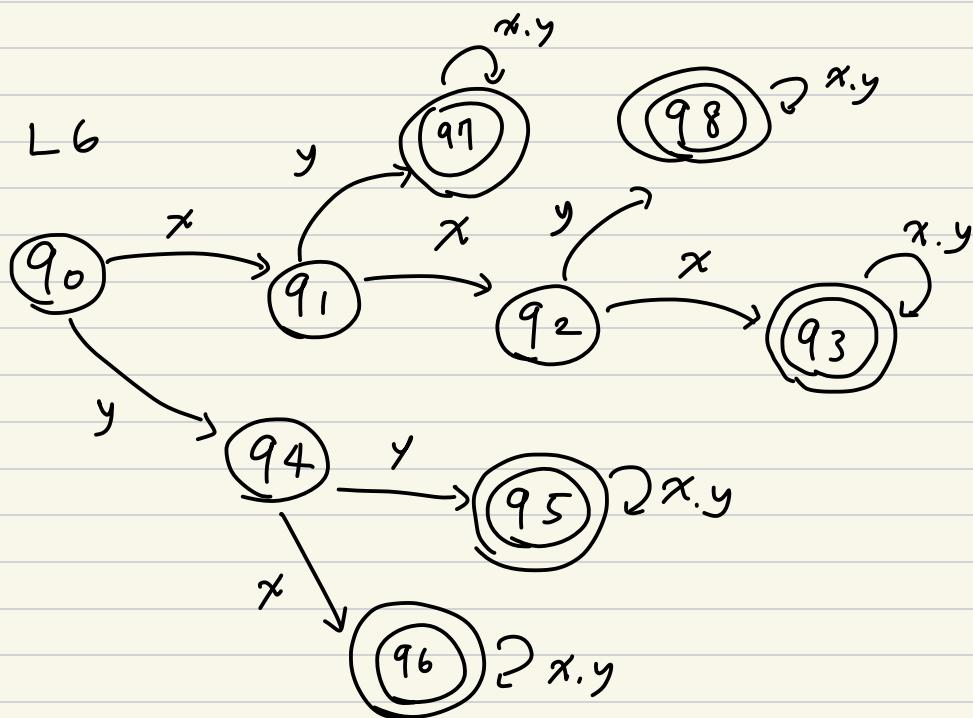
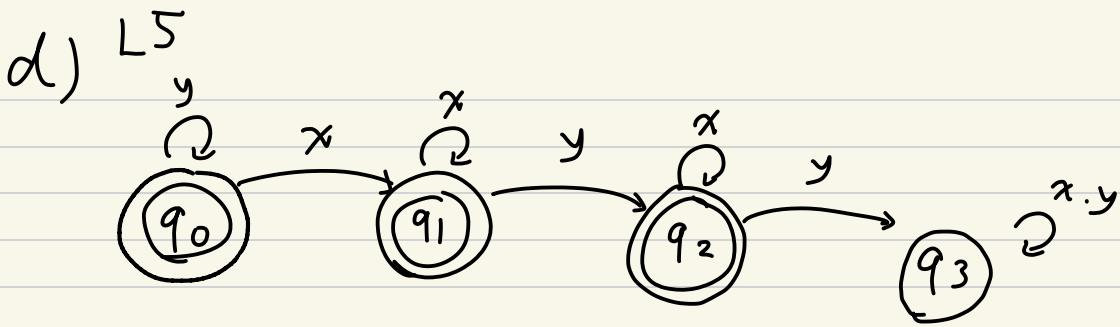
Start state = q_0

$$F = \{ q_2 \}$$

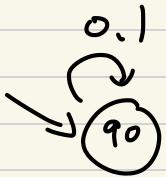
	x	y
q_0	q_3	q_1
q_1	q_2	q_0
q_2	q_2	q_1

c)





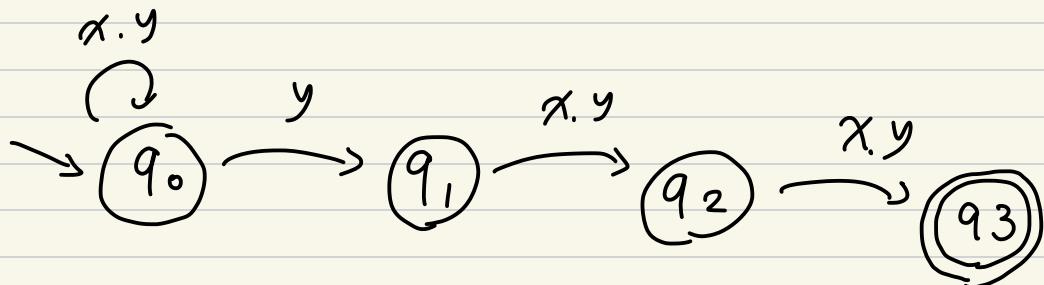
e) The reason why multiples of 6 can't be represented using only the alphabets $\Sigma = \{0, 1\}$, the state diagram of DFA show below



2.

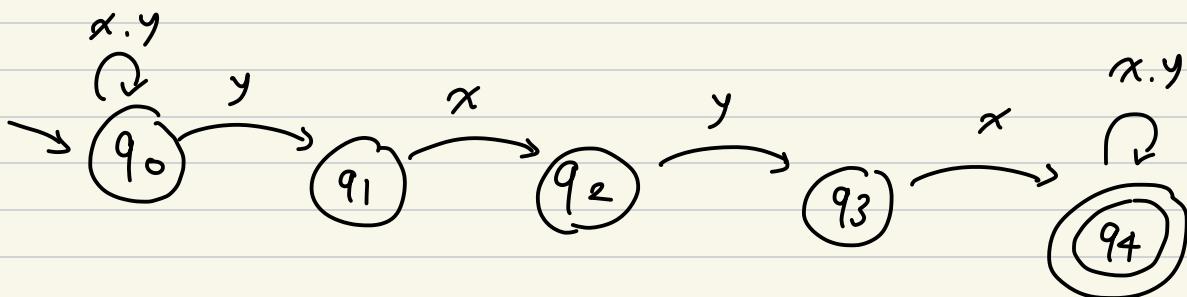
a)

$$(x \vee y)^* y (x \vee y) (x \vee y)$$

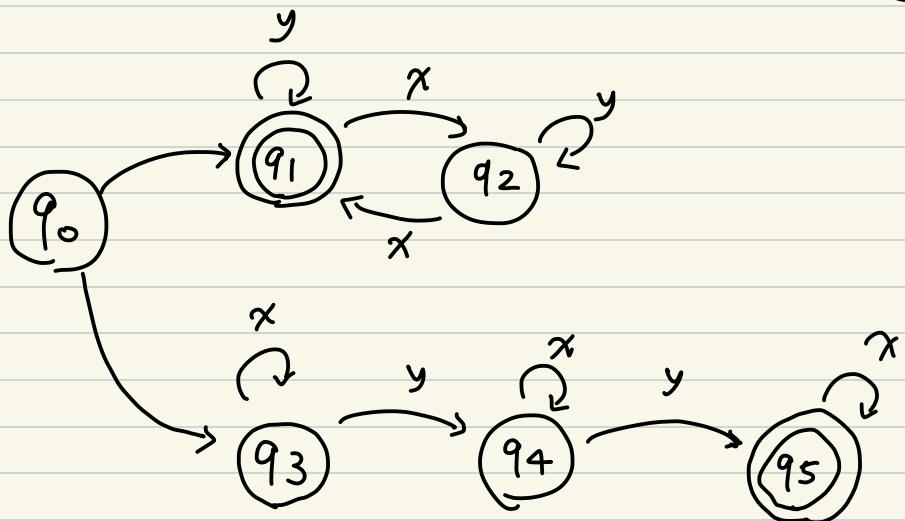


b)

L 8

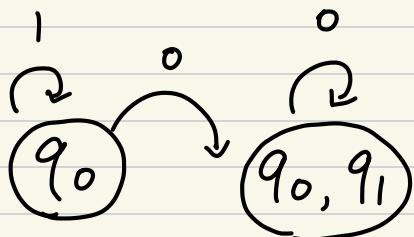


L 9



C) Step 1

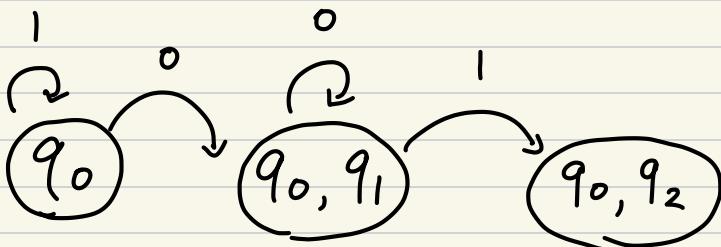
$$q_0 \xrightarrow{0} q_0 \quad q_0 \xrightarrow{1} q_0$$
$$\downarrow$$
$$q_1$$



Step 2

$$q_0 \xrightarrow{0} q_0$$
$$q_0 \xrightarrow{0} q_1$$
$$q_0 \xrightarrow{1} q_0$$
$$q_1 \xrightarrow{0} x$$
$$q_1 \xrightarrow{1} q_2$$

Step 3



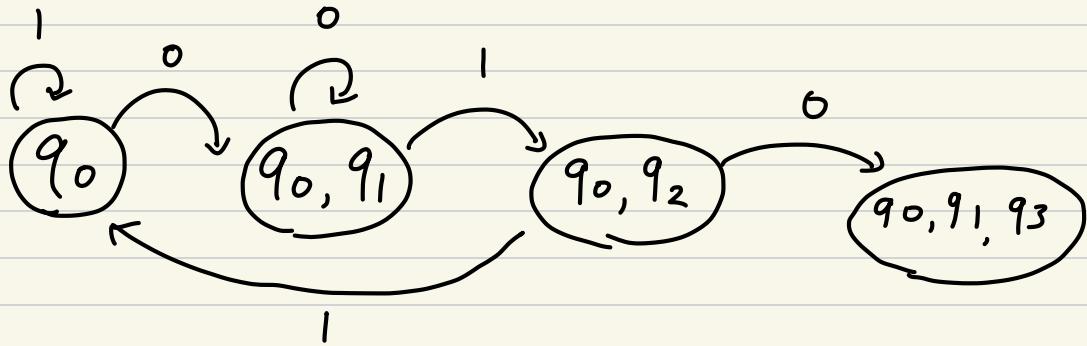
$$q_0 \xrightarrow{0} q_0$$
$$q_0 \xrightarrow{0} q_1$$
$$q_2 \xrightarrow{0} q_3$$

Step 3

$$q_0 \xrightarrow{0} q_0$$
$$q_0 \xrightarrow{0} q_1$$

$$q_2 \xrightarrow{0} q_3$$

$$q_0 \xrightarrow{1} q_0$$
$$q_2 \xrightarrow{1} x$$



Step 4

$$q_0 \xrightarrow{0} q_0$$
$$q_0 \xrightarrow{0} q_1$$
$$q_1 \xrightarrow{0} x$$
$$q_2 \xrightarrow{0} q_3$$
$$q_0 \xrightarrow{1} q_0$$
$$q_1 \xrightarrow{1} q_2$$
$$q_3 \xrightarrow{1} x$$

