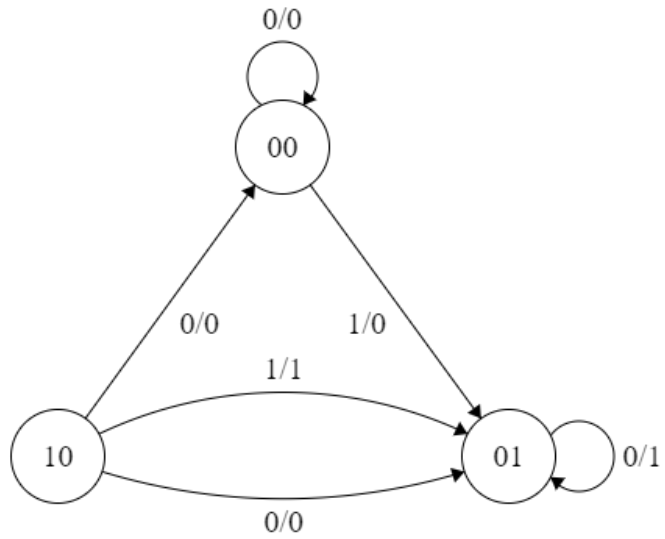


Sequential Circuit Using State Diagram



Truth Table:

Q ₁	Q ₂	x	Q ₁ ⁺	Q ₂ ⁺	y
0	0	0	0	0	0
0	0	1	0	1	0
0	1	0	1	0	0
0	1	1	0	1	0
1	0	0	0	0	0
1	0	1	0	1	1
1	1	0	x(1)	x(0)	x(0)
1	1	1	x(0)	x(1)	x(1)

K-Map Q_1^+ :

			Q2	
Q1	0	0	0	1
	0	0	x	x
			x	

$$Q_1^+ = Q_2x' \quad (6 = 1; 7 = 0)$$

K-Map Q_2^+ :

		Q2		
Q1	0	1	1	0
	0	1	x	x
		x		

$$Q_2^+ = x \quad (6 = 0; 7 = 1)$$

K-Map Q_3^+ :

		Q2		
Q1	0	0	0	0
	0	1	x	x
		x		

$$Q_3^+ = Q_1x$$

This circuit is self-correcting: the forbidden state (11) lead into two authorized states (10) and (01).

Truth Table:

Q ₁	Q ₂	x	Q ₁ ⁺	Q ₂ ⁺	y	T ₁	T ₂	z
0	0	0	0	0	0	0	0	0
0	0	1	0	1	0	0	1	0
0	1	0	1	0	0	1	1	0
0	1	1	0	1	0	0	0	0
1	0	0	0	0	0	1	0	0
1	0	1	0	1	1	1	1	1
1	1	0	x(1)	x(0)	x(0)	x(1)	x(1)	x(0)
1	1	1	x(0)	x(1)	x(1)	x(1)	x(0)	x(1)

K-Map T₁:

		Q2	
		0	1
Q1	0	1	x
	1	x	x
		x	

$$T_1 = Q_1 + Q_2x' \quad (\text{both } x's \text{ in } T_1 \text{ become } 1's)$$

K-Map T₂:

		Q2	
		0	1
Q1	0	1	x
	1	x	x
		x	

$$T_2 = Q_2'x + Q_2x' \quad (6 \text{ in } T_2 = 1; 7 \text{ in } T_2 = 0)$$

K-Map of z is unnecessary. The values of z are identical to those in y including the x's.

The forbidden state (11) leads into itself (11) in row 7 but it does lead into authorized state (10) in row 8.