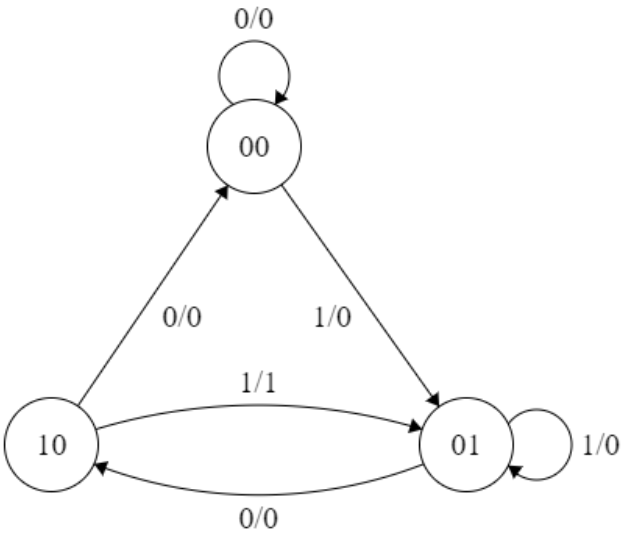
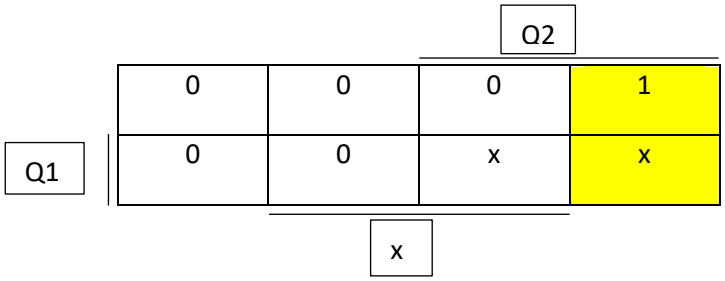
Sequential Circuit Using State Diagram



Truth Table:

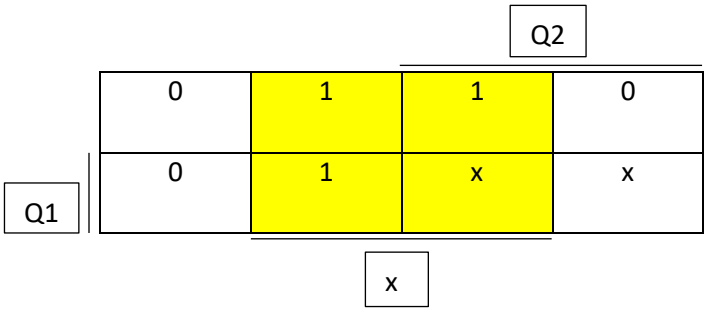
Q_1	Q_2	x	Q_1^+	Q_2^+	y
0	0	0	0	0	0
0	0	1	0	1	0
0	1	0	1	0	0
0	1	1	0	1	0
1	0	0	0	0	0
1	0	1	0	1	1
1	1	0	x(1)	x(0)	x(0)
1	1	1	x(0)	x(1)	x(1)

K-Map Q_1^+:



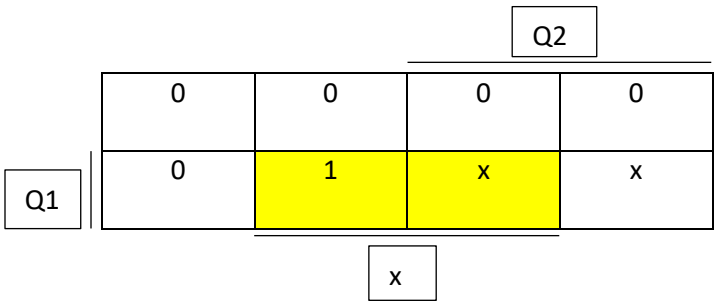
$Q_1^+ = Q_2x'$ (6 = 1; 7 = 0)

K-Map Q_2^+:



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

K-Map Q_3^+:



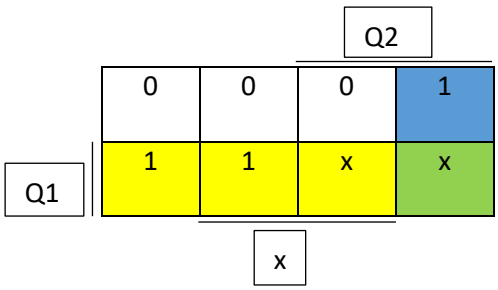
$Q_3^+ = Q_1x$

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

Truth Table:

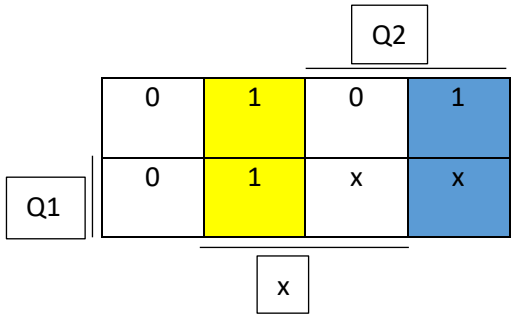
Q_1	Q_2	x	Q_1^+	Q_2^+	y	T_1	T_2	z
0	0	0	0	0	0	0	0	0
0	0	1	0	1	0	0	1	0
0	1	0	1	0	0	1	1	0
0	1	1	0	1	0	0	0	0
1	0	0	0	0	0	1	0	0
1	0	1	0	1	1	1	1	1
1	1	0	x(1)	x(0)	x(0)	x(1)	x(1)	x(0)
1	1	1	x(0)	x(1)	x(1)	x(1)	x(0)	x(1)

K-Map T_1:



$T_1 = Q_1 + Q_2x'$ (both x's in T_1 become 1's)

K-Map T_2:



$T_2 = Q_2'x + Q_2x'$ (6 in T_2 = 1; 7 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.