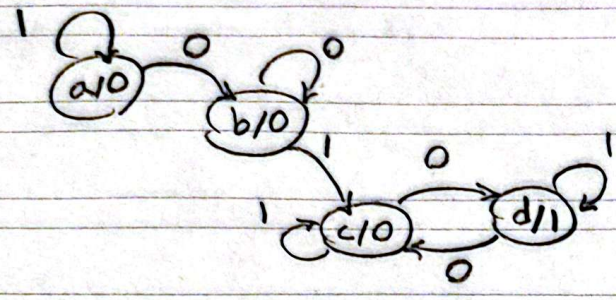
آزمون پایان ترم اصل

شماره دانشجویی: ۴۰۲۱۰۵۷۹۴

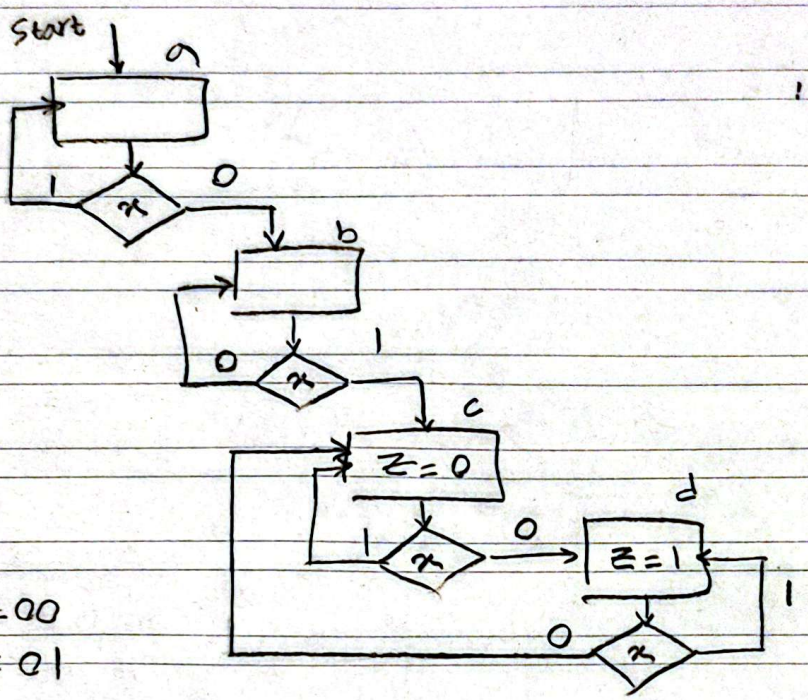
تمرین هشتم مدارهای منطقی:

(۱)

نمودار حالت:



ASM Chart:



state assignment:

a = 00
b = 01
c = 10
d = 11

$Q_1 Q_0$

به ۴ حالت نیاز داریم یعنی دو فلیپ فلاپ نیاز داریم

P.S. Q_1	P.S. Q_0	in x	N.S. Q_1^+	N.S. Q_0^+	out z
0	0	0	0	1	0
0	0	1	0	0	0
0	1	0	0	1	0
0	1	1	1	0	0
1	0	0	1	1	0
1	0	1	1	0	0
1	1	0	1	0	1
1	1	1	1	1	1

$Q_1 Q_0$ / x

x \ $Q_1 Q_0$	00	01	11	10
0	0	0	1	0
1	0	0	1	0

$z = Q_1 Q_0$

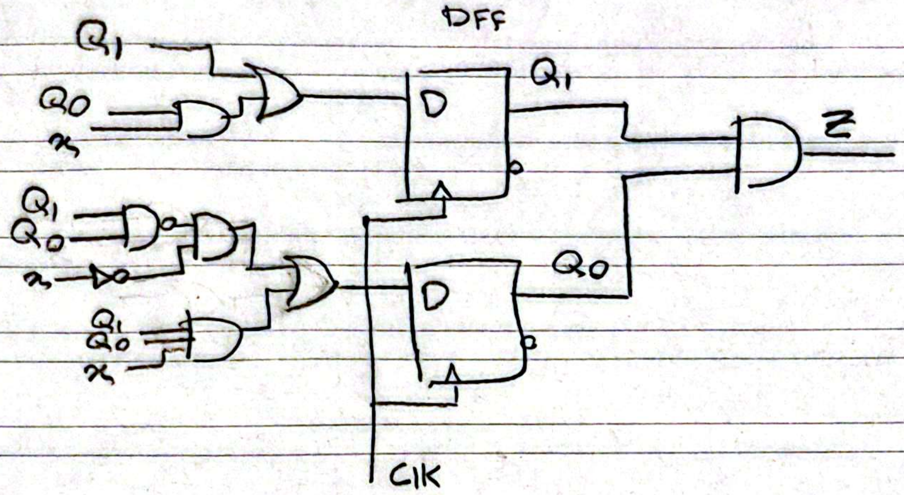
$x \backslash Q_1Q_0$	00	01	11	10
0	0	0	1	1
1	0	1	1	1

$x \backslash Q_1Q_0$	00	01	11	10
0	1	1	0	1
1	0	0	1	0

$Q_1^+ = Q_1 + Q_0 x$

$Q_0^+ = Q_1'x' + Q_0'x' + Q_1Q_0x$

مدار:



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One Hot: به چهار فلیپ فلاپ برای حالت های A، B، C و D نیاز داریم

$A^+ = Ax' + Dx$

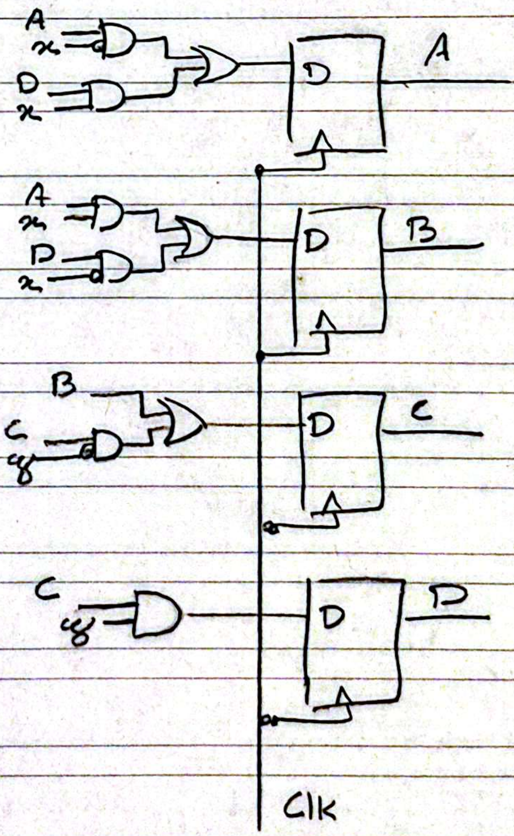
$B^+ = Ax + Dx'$

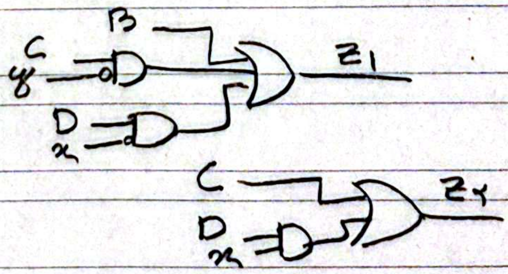
$C^+ = B + Cy'$

$D^+ = Cy$

$Z_1 = B + Cy' + Dx'$

$Z_2 = C + Dx$





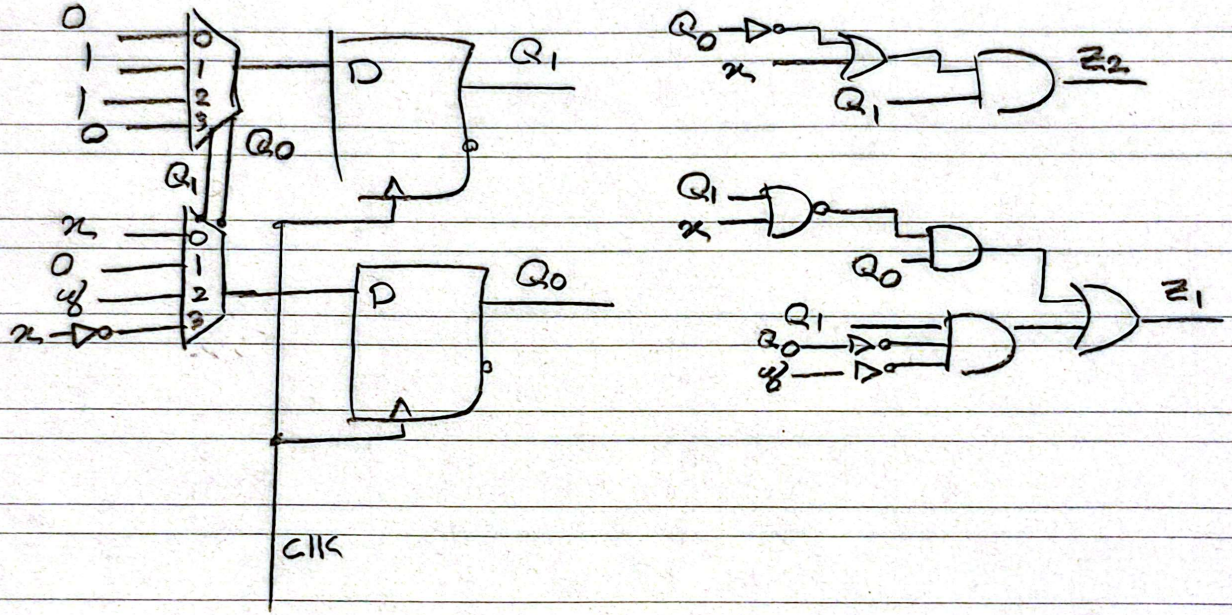
MUX:

بیت‌های حالت‌ها Q_1, Q_0 در نظر می‌گیریم.

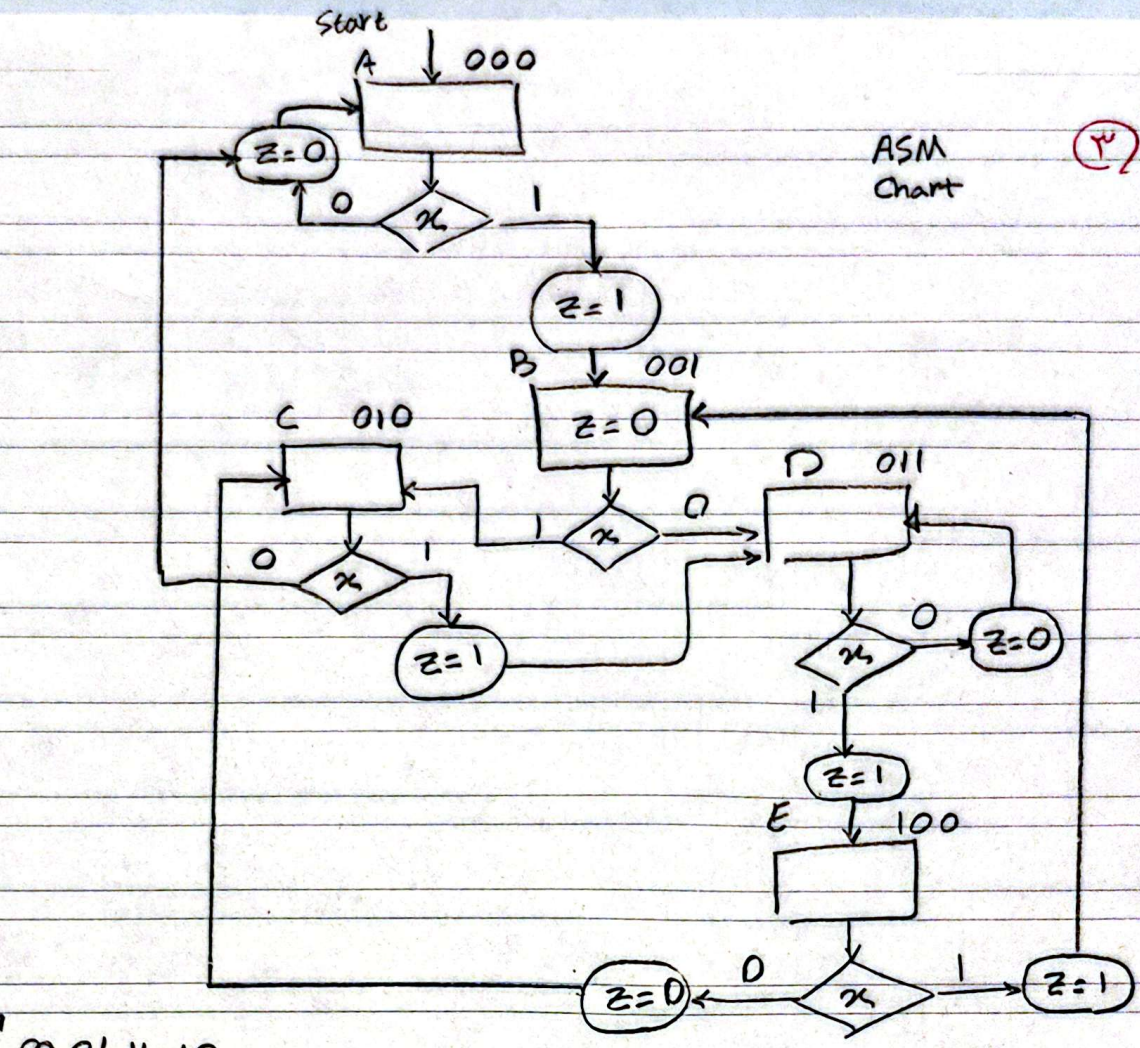
Q_1	Q_0	Q_1^+	Q_0^+	شرط ورودی	MUX_1	MUX_0
0	0	0	0	x'	0	x
0	0	0	1	x		
0	1	1	0	1	1	0
1	0	1	0	y'	1	y
1	0	1	1	y		
1	1	0	0	x	0	x'
1	1	0	1	x'		

$$z_1 = Q_1'Q_0 + Q_1Q_0'y' + Q_1Q_0x' = Q_1'Q_0 + Q_0x' + Q_1Q_0'y'$$

$$z_2 = Q_1Q_0' + Q_1Q_0x = Q_1(Q_0' + Q_0x) = Q_1Q_0' + Q_1x$$



ASM Chart (۳)



Q_2Q_1 / Q_0x	00	01	11	10
0	0	0	X	0
1	1	1	X	1
11	0	1	X	X
10	0	0	X	X

بیت های Q_2 ، Q_1 ، Q_0 در نظر گرفته شده است.

$$z = Q_0'x + Q_1x = (Q_0' + Q_1)x = B'x$$

Q_2	Q_1	Q_0	x	Q_2^+	Q_1^+	Q_0^+	z
0	0	0	0	0	0	0	0
0	0	0	1	0	0	1	1
0	0	1	0	0	1	1	0
0	0	1	1	0	1	0	0
0	1	0	0	0	0	0	0
0	1	0	1	0	1	1	1
0	1	1	0	0	1	1	0
0	1	1	1	1	0	0	1
1	0	0	0	0	1	0	0
1	0	0	1	0	0	1	1

Q_0x \ Q_2Q_1	00	01	11	10
00	0	0	X	0
01	0	0	X	0
11	0	1	X	X
10	0	0	X	X

$$Q_2^+ = Q_1Q_0x$$

Q_0x \ Q_2Q_1	00	01	11	10
00	0	0	X	1
01	0	1	X	0
11	1	0	X	X
10	1	1	X	X

$$Q_1^+ = Q_0x' + Q_1'Q_0 + Q_1Q_0'x + Q_2x'$$

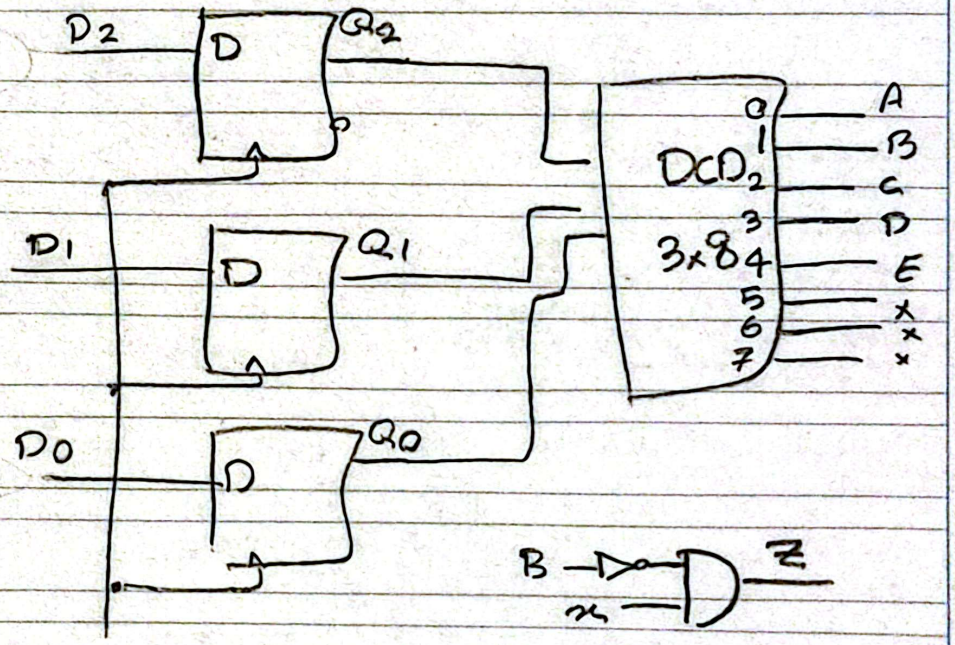
Q_0x \ Q_2Q_1	00	01	11	10
00	0	0	X	0
01	1	1	X	1
11	0	0	X	X
10	1	1	X	X

$$Q_0^+ = Q_0'x + Q_0x' = Q_0 \oplus x$$

$$D_2 = Q_2^+ = Q_1Q_0x = Dx$$

$$D_1 = Q_1^+ = (B+D)x' + B + Cx + Ex' =$$
$$B + Cx + Dx' + Ex'$$

$$D_0 = Q_0^+ = Q_0 \oplus x =$$
$$(B+D) \oplus x$$

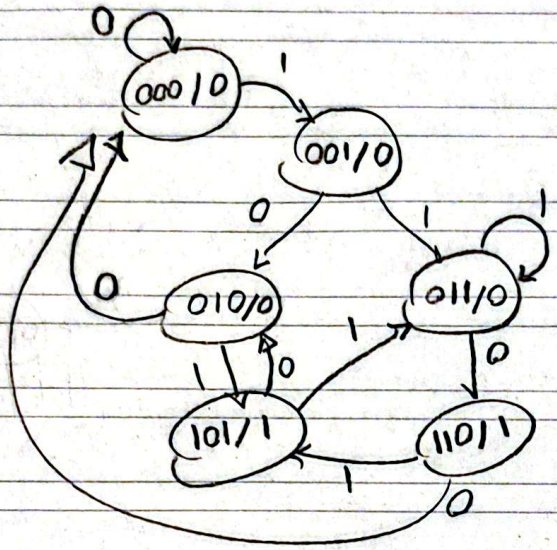


۴) جدول حالت

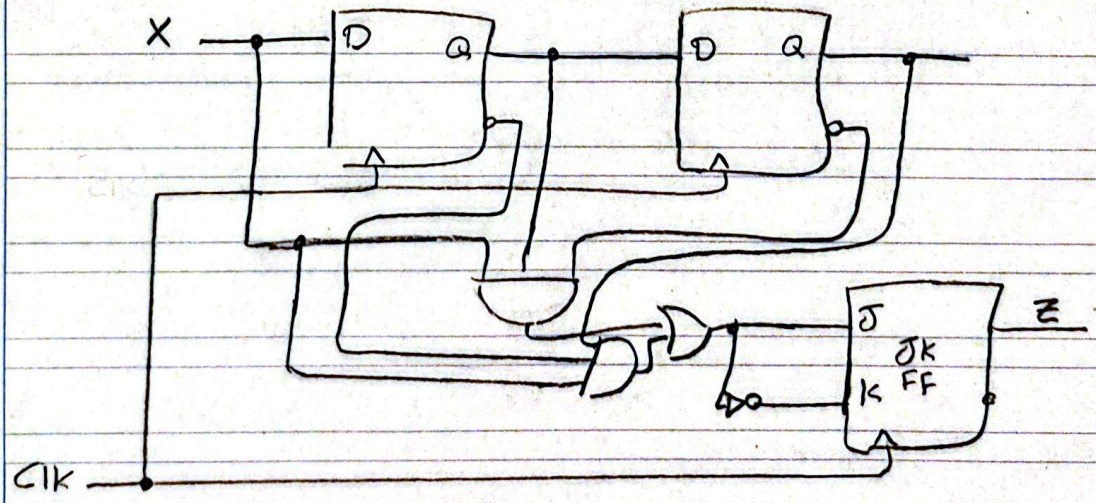
P.S.	N.S. $x=0$	N.S. $x=1$	Out
→ 000	000	001	0
001	010	011	0
010	100	101	0
→ 011	110	111	0
100	000	001	0
101	010	011	1
110	100	101	1
111	110	111	0

حالت‌های معادل

نمودار حالت



روش حافظه محدود، شیفت رجیستر با DFF و JKFF



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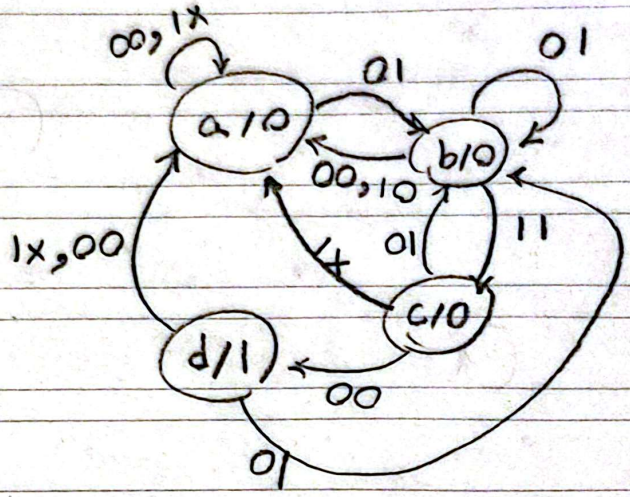
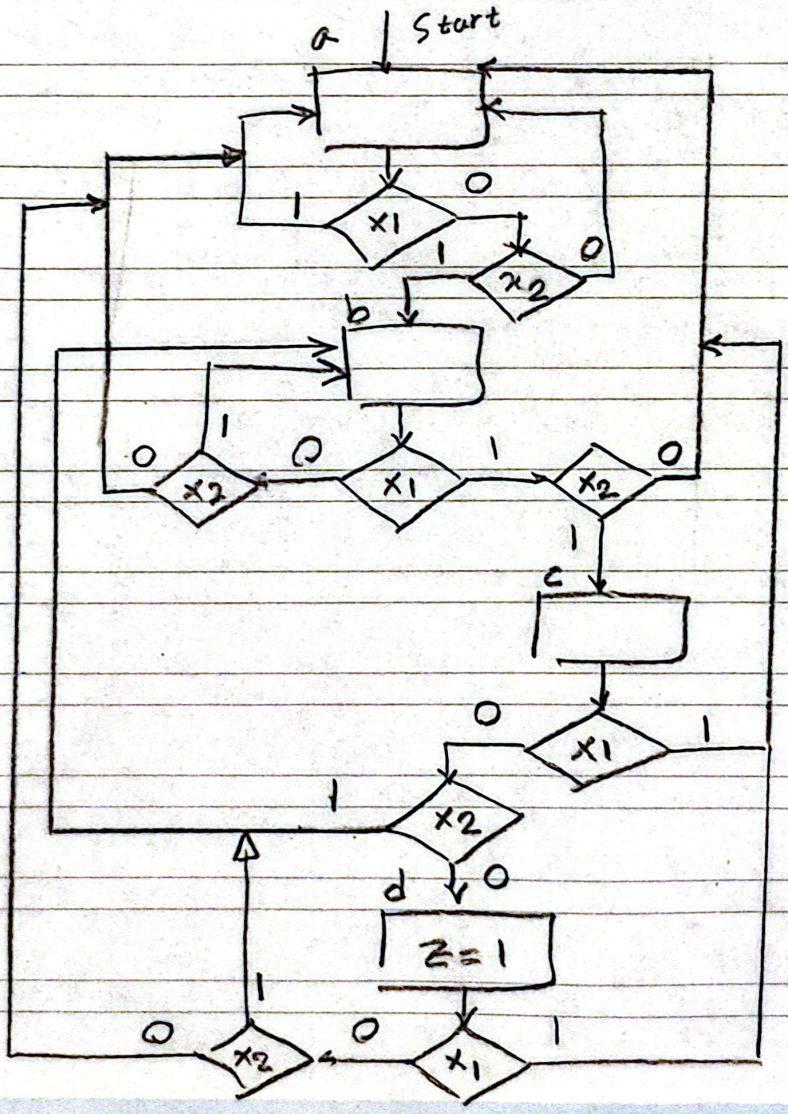
نمودار حالت



ASM Chart



a: 00 b: 01 c: 10 d: 11 ($Q_1 Q_0$)

جدول حالت:

Q_1	Q_0	x_1	x_2	Q_2^+	Q_1^+
0	0	0	0	0	0
0	0	0	1	0	1
0	0	1	X	0	0
0	1	0	0	0	0
0	1	0	1	0	1
0	1	1	0	0	0
0	1	1	1	1	0
1	0	0	0	1	1
1	0	0	1	0	1
1	0	1	X	0	0
1	1	0	0	0	0
1	1	0	1	0	1
1	1	1	X	0	0

$Q_1 Q_0$ / $x_1 x_2$

	00	01	11	10
00	0	0	0	1
01	0	0	0	0
11	0	1	0	0
10	0	0	0	0

$$Q_1^+ = Q_1 Q_0' x_1' x_2' + Q_1' Q_0 x_1 x_2$$

$Q Q_0$ / $x_1 x_2$

	00	01	11	10
00	0	0	0	1
01	1	1	1	1
11	0	0	0	0
10	0	0	0	0

$$Q_0^+ = x_1' x_2 + Q_1 Q_0' x_1'$$

$$Z = Q_1 Q_0$$

مدار: