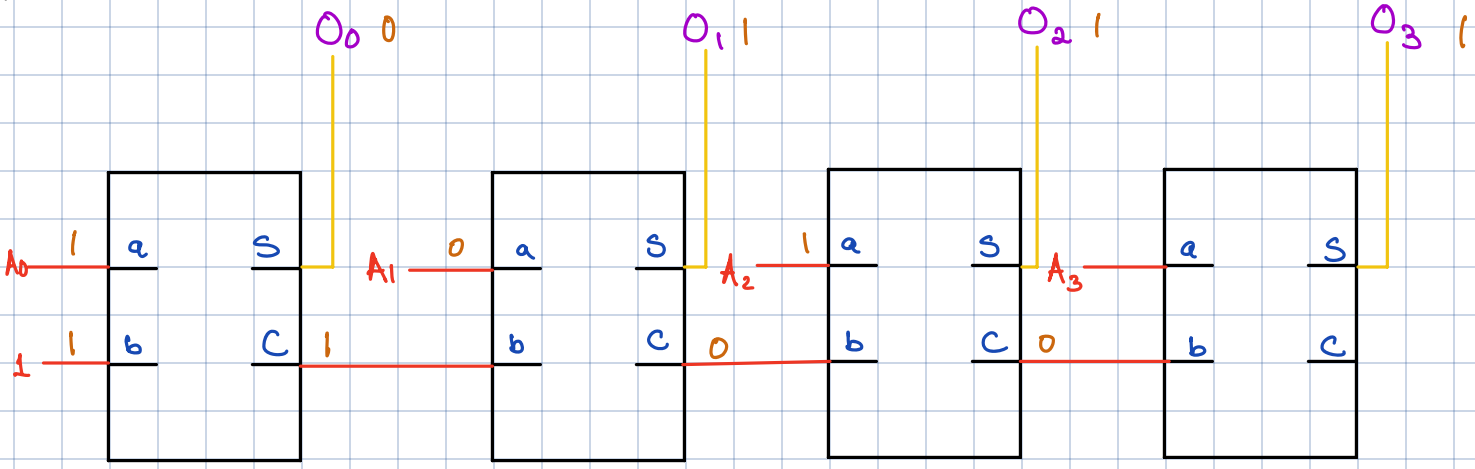
Chapter: 04

1101

Q4.



Q5.

x_1	x_0	y_1	y_0	S_1	S_0	C
0	0	0	0	0	0	0
0	0	0	1	0	1	0
0	0	1	0	1	0	0
0	0	1	1	1	1	0
0	1	0	0	0	1	0
0	1	0	1	1	0	0
0	1	1	0	1	1	0
0	1	1	1	0	0	1
1	0	0	0	1	0	0
1	0	0	1	1	1	0
1	0	1	0	0	0	1
1	0	1	1	0	1	1
1	1	0	0	1	1	0
1	1	0	1	0	0	1
1	1	1	0	0	1	1
1	1	1	1	1	0	1

S_1

x_1x_0 \ y_1y_0	00	01	11	10
00	0	0	1	1
01	0	1	0	1
11	1	0	1	0
10	1	1	0	0

$$S_1 = x_1\bar{y}_1\bar{y}_0 + x_1\bar{x}_0\bar{y}_1 + x_1x_0y_1y_0 + \bar{x}_1x_0\bar{y}_1y_0 + \bar{x}_1y_1\bar{y}_0 + \bar{x}_1y_1\bar{y}_0$$

S_0

x_1x_0 \ y_1y_0	00	01	11	10
00	0	1	1	0
01	1	0	0	1
11	1	0	0	1
10	0	1	1	0

$S_0 = x_0\overline{y_0} + \overline{x_0}y_0$

C

x_1x_0 \ y_1y_0	00	01	11	10
00	0	0	0	0
01	0	0	0	0
11	0	1	1	1
10	0	0	1	1

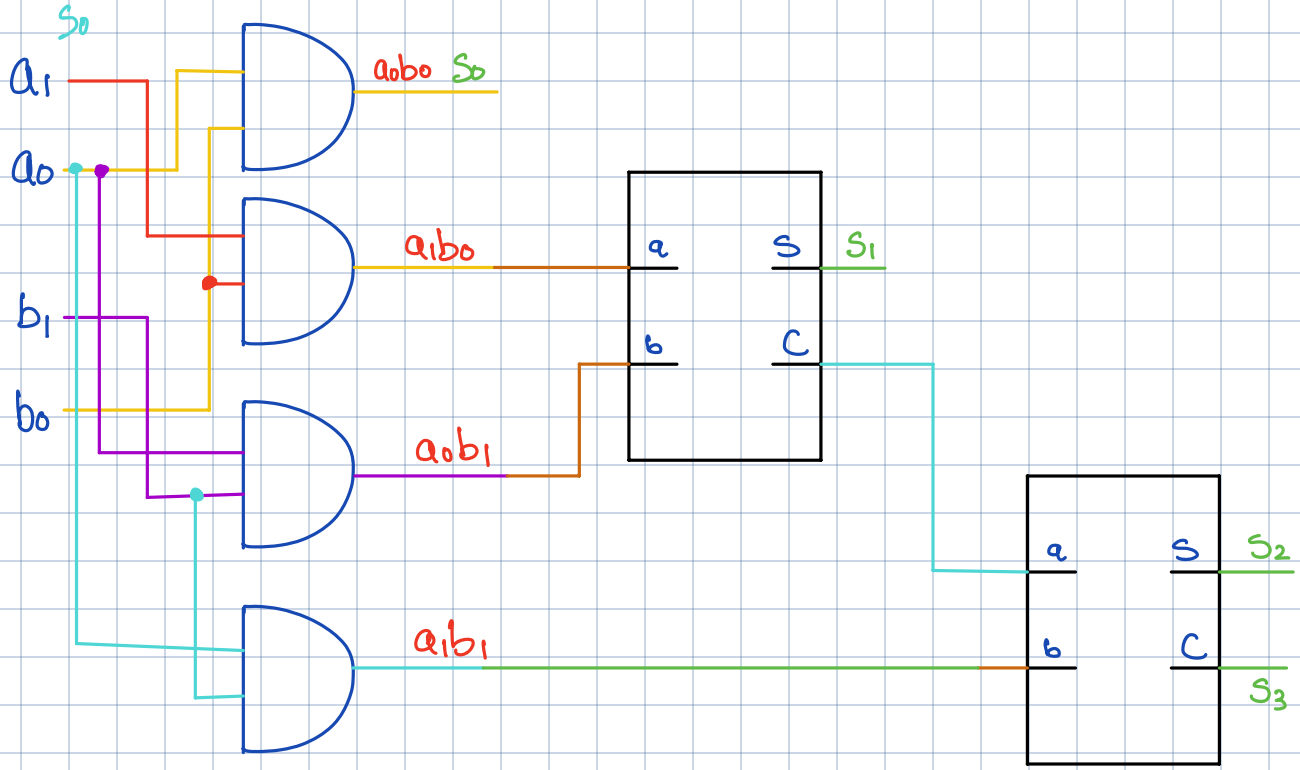
$C = x_1x_0y_0 + x_1y_1$

4.7

$a_1\ a_0$
$b_1\ b_0$

$a_1b_0\ a_0b_0$
$+\quad +$
$a_1b_1\ a_0b_1\ X$

$S_2\ S_2\ a_0b_0$



Chapter: 06

Q8.

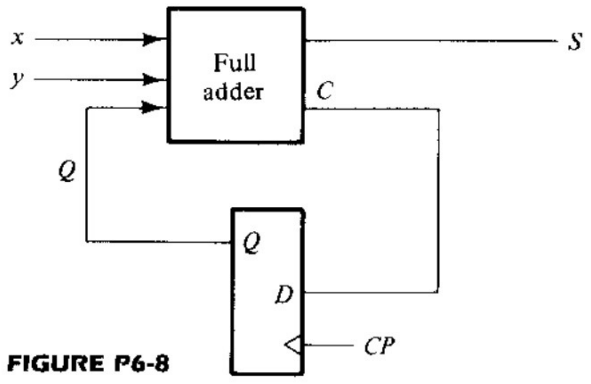
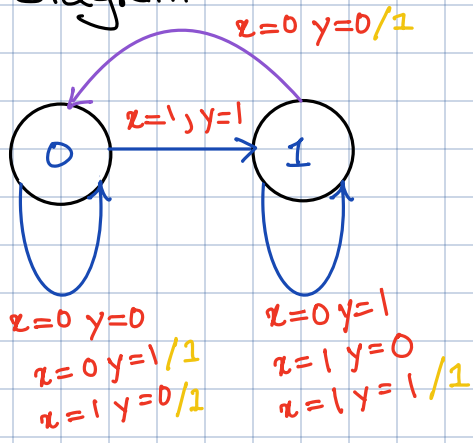


FIGURE P6-8

State table:

Q	x	y	S	C	Q^+
0	0	0	0	0	0
0	0	1	1	0	0
0	1	0	1	0	0
0	1	1	0	1	1
1	0	0	1	0	0
1	0	1	0	1	1
1	1	0	0	1	1
1	1	1	1	1	1

State diagram



Q9.

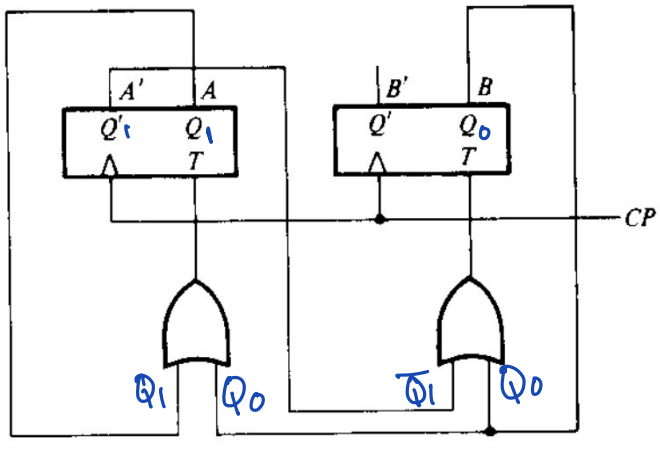
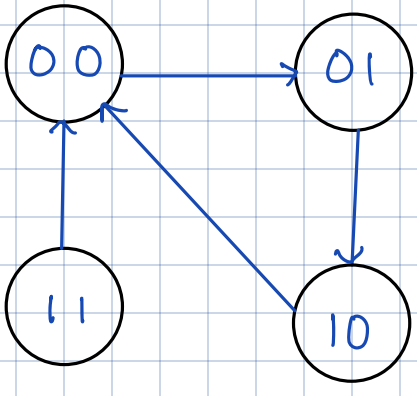


FIGURE P6-9

$T_1 = Q_1 + Q_0$

$T_0 = \overline{Q_1} + Q_0$

Q_1	Q_0	Q_1^+	Q_0^+
0	0	0	1
0	1	1	0
1	0	0	0
1	1	0	0



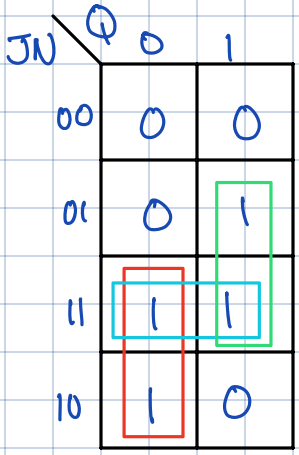
6.10

1. State table

J	N	Q
0	0	0
0	1	Q
1	0	Q'
1	1	1

2. Characteristic table

J	N	Q	Q^+
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

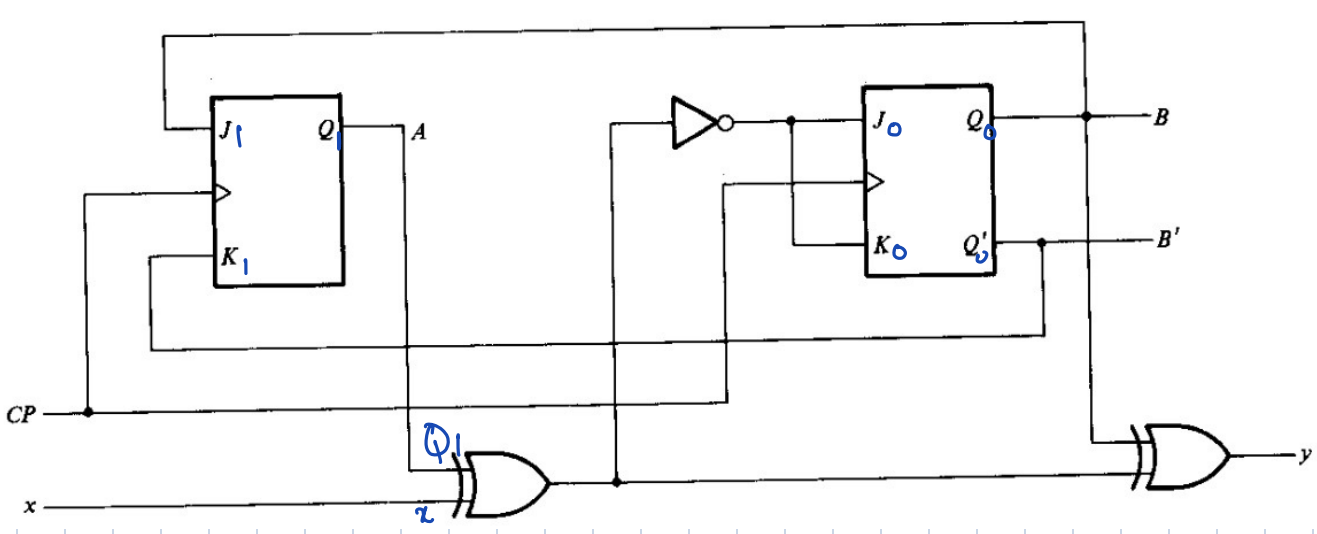


$$Q^+ = J\bar{Q} + JN + NQ$$

3. Excitation table

Q	Q^+	J	N
0	→ 0	0	X
0	→ 1	1	X
1	→ 0	X	0
1	→ 1	X	1

Q11.

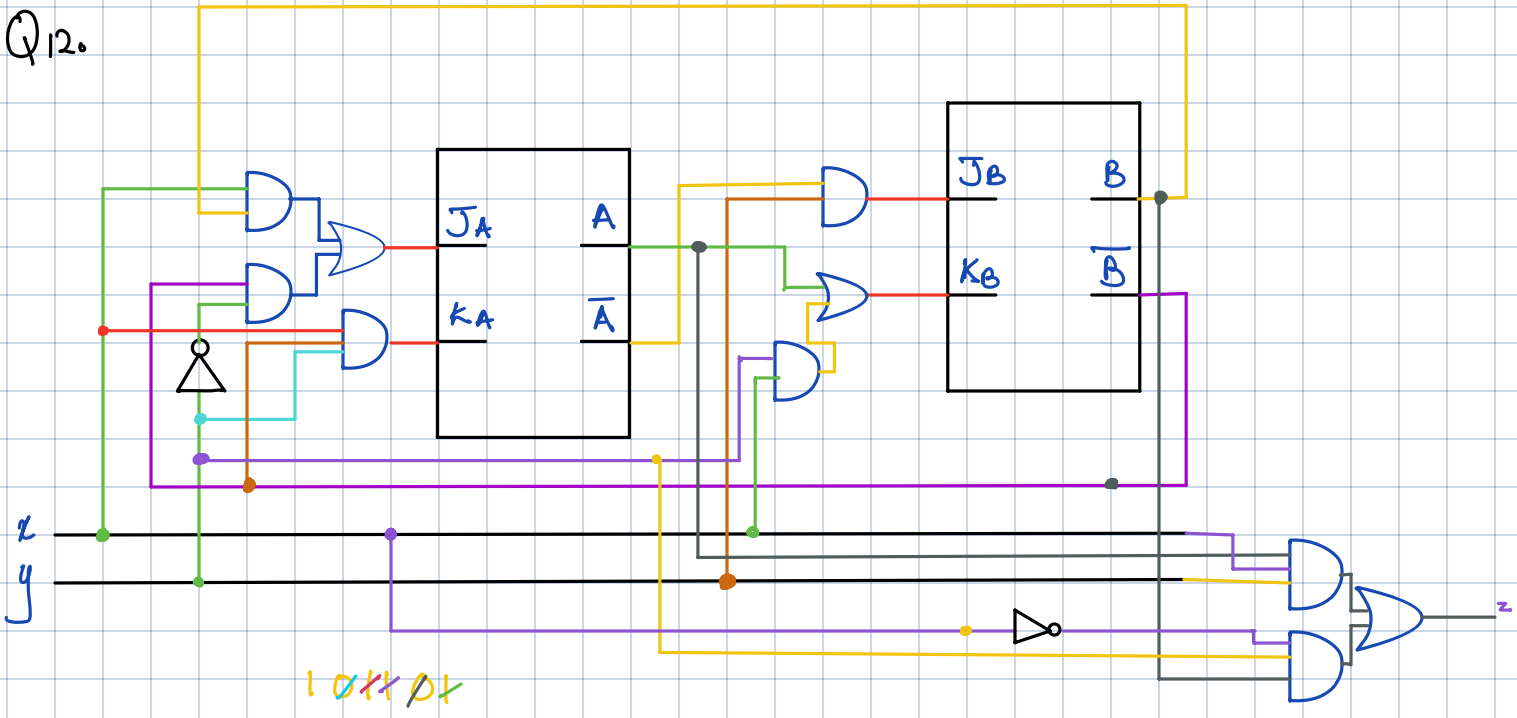


$J_0 = \overline{(x \oplus Q_1)} = K_0$ $\quad J_1 = Q_0$ $\quad k_1 = \overline{Q_0}$ $\quad y = (x \oplus Q_1) \oplus Q_0$

State table

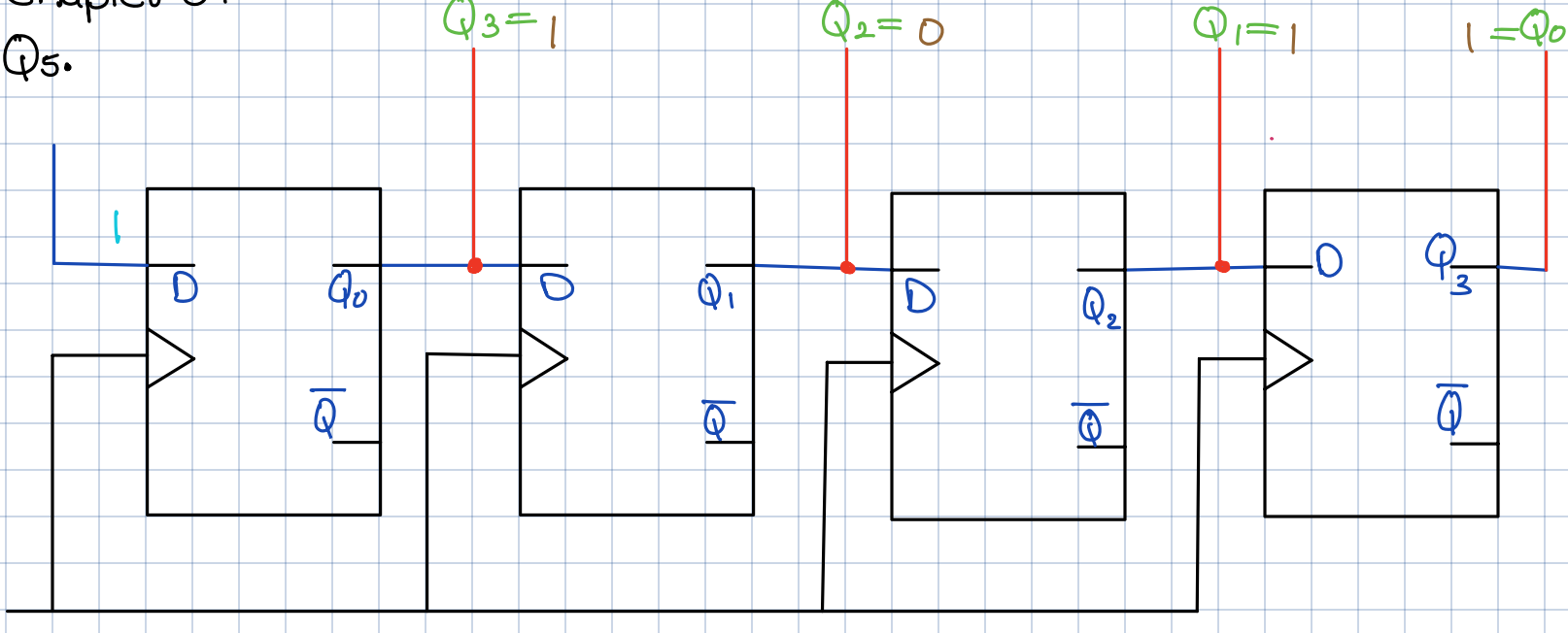
x	Q_1	Q_0	Q_1^+	Q_0^+	y
0	0	0	0	1	0
0	0	1	1	0	1
0	1	0	0	0	1
0	1	1	1	1	0
1	0	0	0	0	1
1	0	1	1	1	0
1	1	0	0	1	0
1	1	1	1	0	1

Q12.



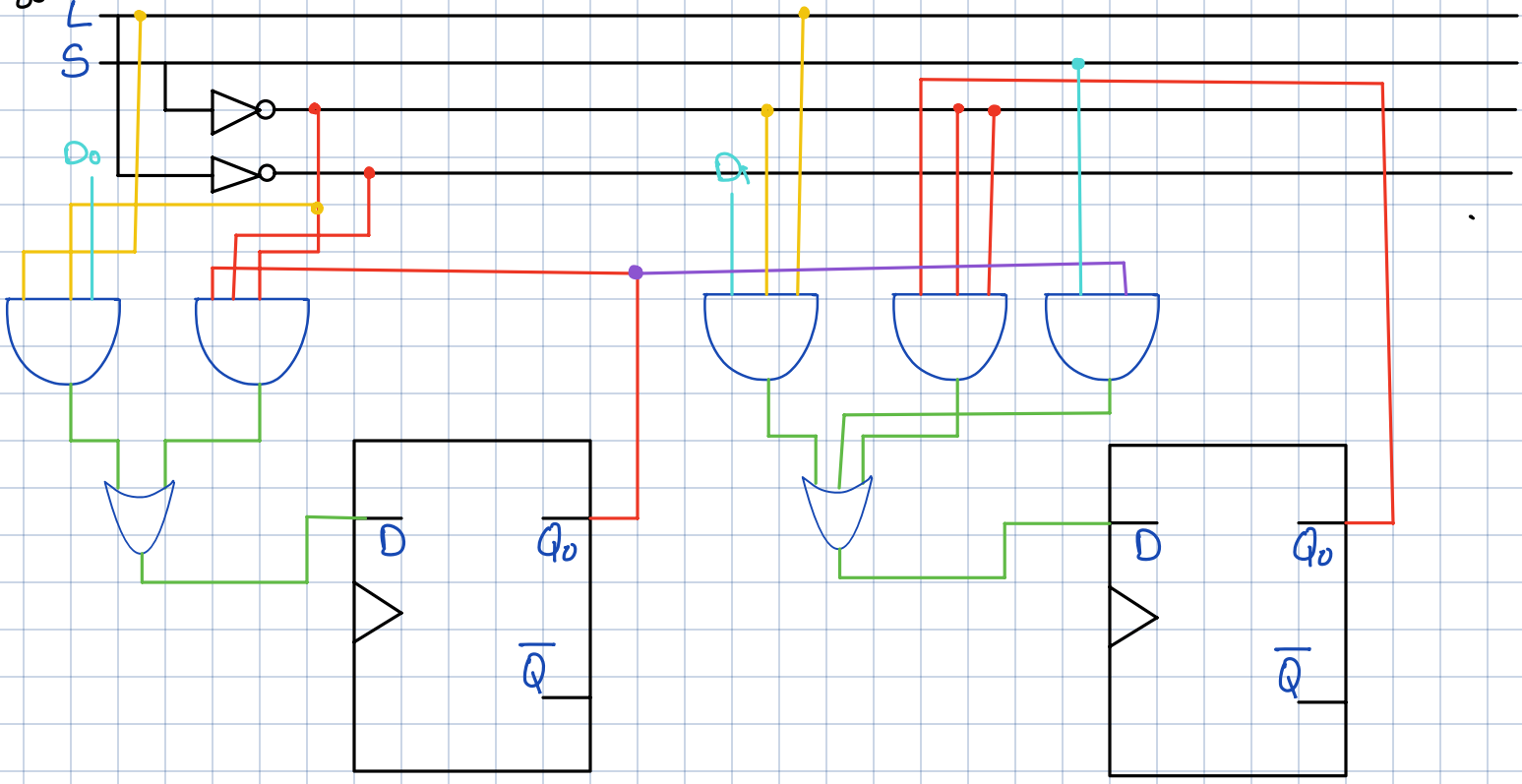
Chapter 07:

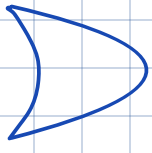
Q5.



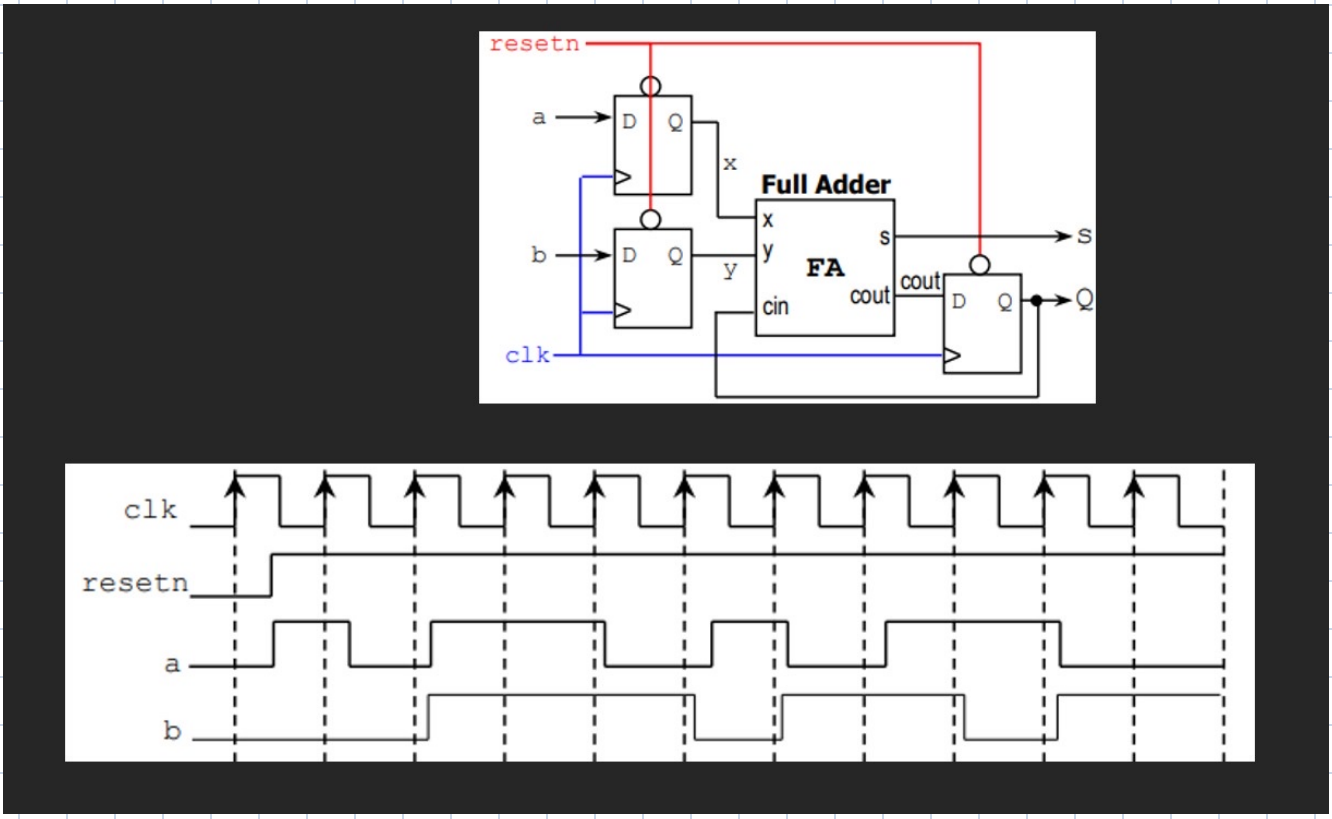
1 1 1 0
0 1 1 1
1 0 1 1
1 1 0 1
0 1 1 0
1 0 1 1

Q8.



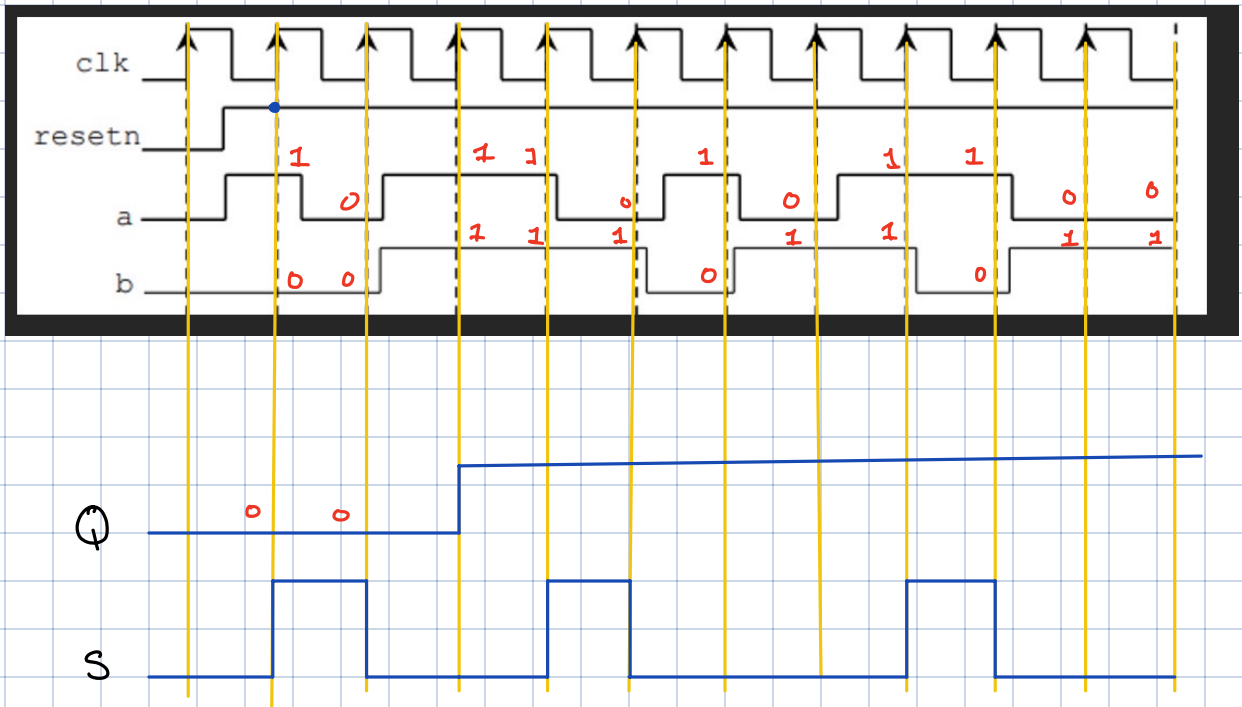


DLD Final papers:

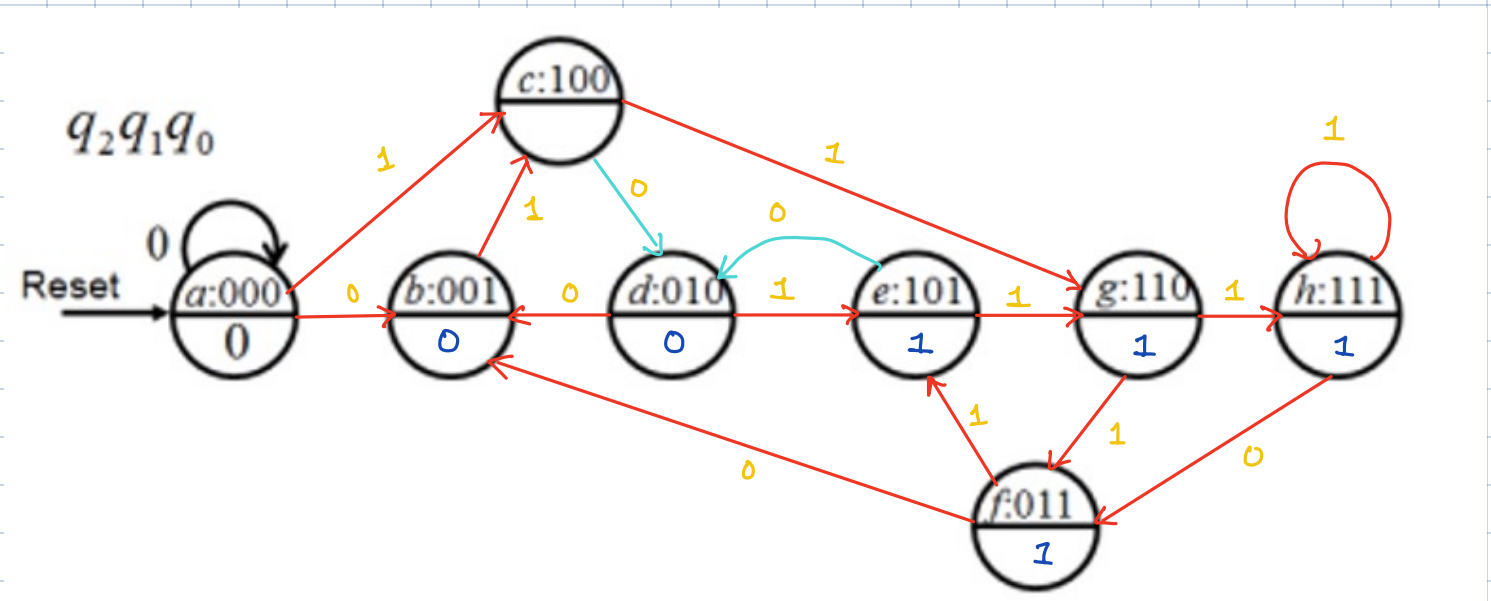


a	b	Q	S	Qn
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

$S = a \oplus b \oplus Q$ $\quad Q = ab + (a \oplus b)Q$

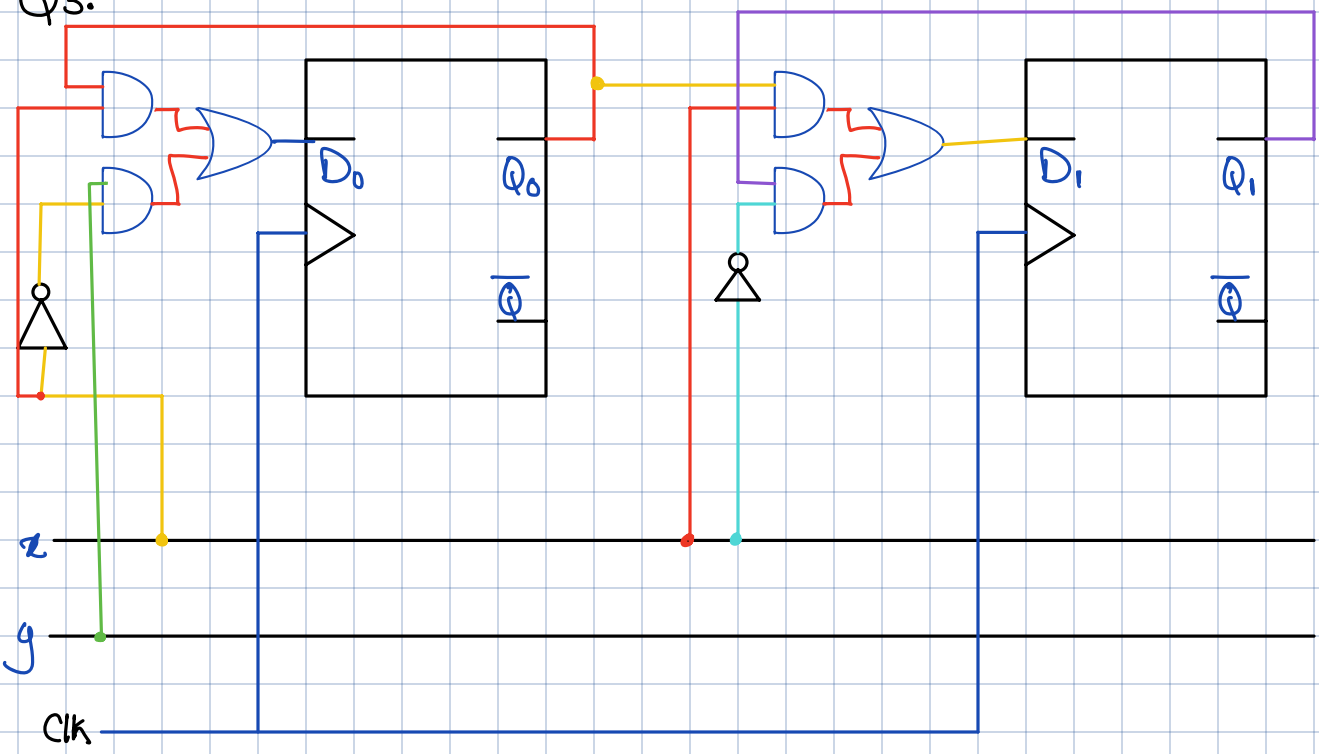


Q2.

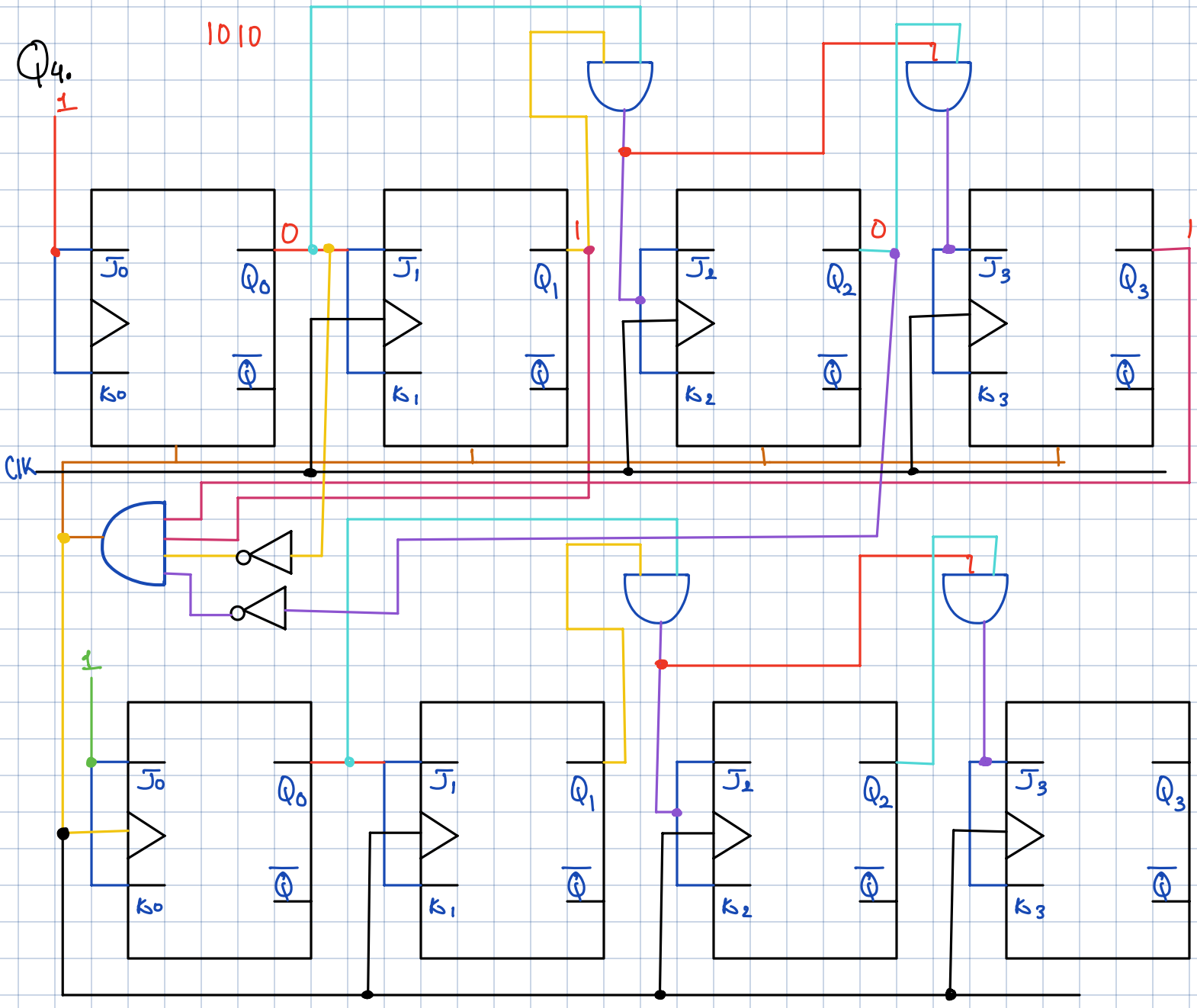


W	q_2	q_1	q_0	q_2^+	q_1^+	q_0^+	Y
0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0
0	0	1	0	0	0	1	0
0	0	1	1	0	0	1	1
0	1	0	0	0	1	0	0
0	1	0	1	0	1	0	1
0	1	1	0	0	1	1	1
0	1	1	1	0	1	1	1
1	0	0	0	1	0	0	0
1	0	0	1	1	0	0	0
1	0	1	0	1	0	1	0
1	0	1	1	1	0	1	1
1	1	0	0	1	1	0	0
1	1	0	1	1	1	0	1
1	1	1	0	1	1	1	1
1	1	1	1	1	1	1	1

Q3.


D0
Q0
Q
D1
Q1
Q
z
y
Clk

Q4.


1010
1
J0
Q0
K0
Q
0
J1
Q1
K1
Q
1
J2
Q2
K2
Q
0
J3
Q3
K3
Q
1
Clk
1
J0
Q0
K0
Q
J1
Q1
K1
Q
J2
Q2
K2
Q
J3
Q3
K3
Q

Q5.

	X_3	X_2	X_1	X_0	O	E	P	N	Z	MA	MI
0	0	0	0	0	0	1	0	0	1	0	0
1	0	0	0	1	1	0	1	0	0	0	0
2	0	0	1	0	0	1	1	0	0	0	0
3	0	0	1	1	1	0	1	0	0	0	0
4	0	1	0	0	0	1	1	0	0	0	0
5	0	1	0	1	1	0	1	0	0	0	0
6	0	1	1	0	0	1	1	0	0	0	0
7	0	1	1	1	1	0	1	0	0	1	0
-8	1	0	0	0	0	1	0	1	0	0	1
-7	1	0	0	1	1	0	0	1	0	0	0
-6	1	0	1	0	0	1	0	1	0	0	0
-5	1	0	1	1	1	0	0	1	0	0	0
-4	1	1	0	0	0	1	0	1	0	0	0
-3	1	1	0	1	1	0	0	1	0	0	0
-2	1	1	1	0	0	1	0	1	0	0	0
-1	1	1	1	1	1	0	0	1	0	0	0

$\overline{X_0}$ $\overline{X_3}(X_2X_1X_0)$ $\overline{X_3}$ $\overline{X_3}\overline{X_2}\overline{X_1}\overline{X_0}$

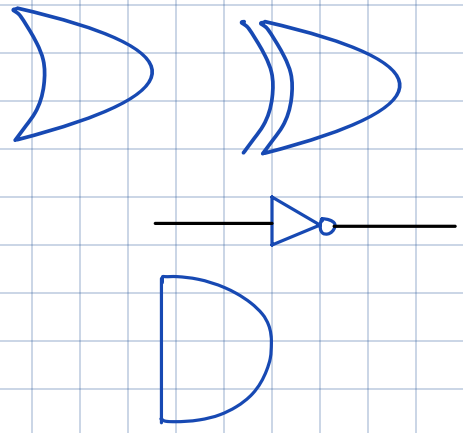
$X_3\overline{X_2}\overline{X_1}\overline{X_0}$

$\overline{X_3}X_2X_1X_0$

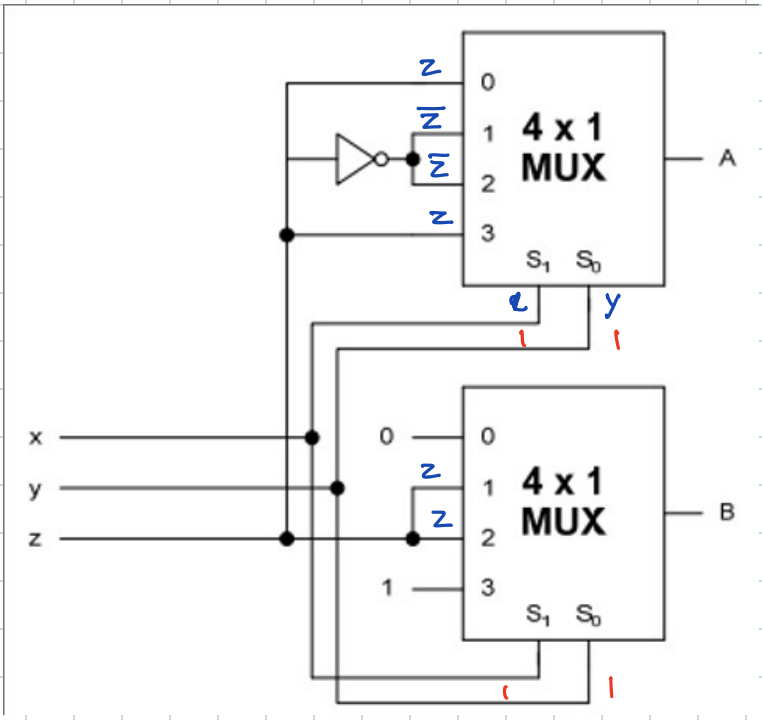
X_3X_2 \ X_1X_0	00	01	11	10
00	0	1	1	1
01	1	1	1	1
11	0	0	0	0
10	0	0	0	0

$$P = \overline{X_3}X_2 + \overline{X_3}X_0 + \overline{X_3}X_1$$

$$= \overline{X_3}(X_0 + X_1 + X_2)$$



Q6.

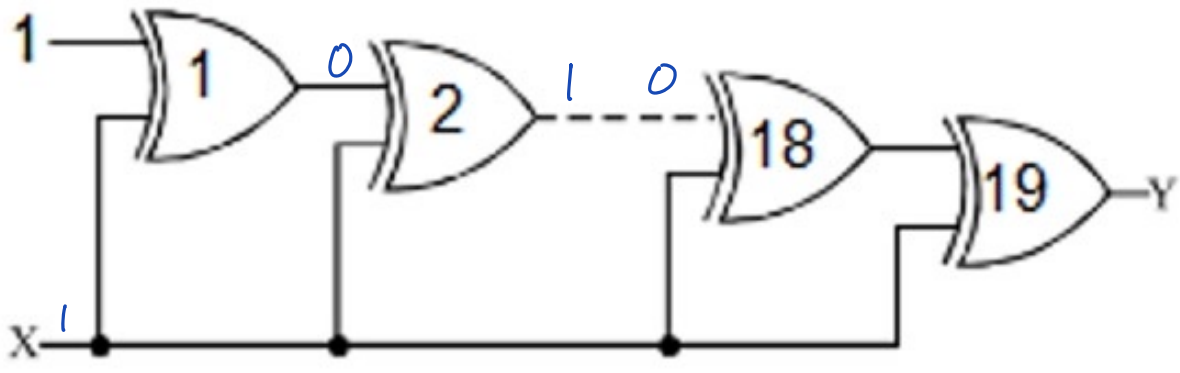


	x	y	z	A	B	
0	0	0	0	0	0	$\bar{x}\bar{y}\bar{z}$
1	0	0	1	1	0	$\bar{x}\bar{y}z$
2	0	1	0	1	0	$\bar{x}y\bar{z}$
3	0	1	1	0	1	$\bar{x}yz$
4	1	0	0	1	0	$x\bar{y}\bar{z}$
5	1	0	1	0	1	$x\bar{y}z$
6	1	1	0	0	1	$xy\bar{z}$
7	1	1	1	1	1	xyz

$A = \sum m(1,2,4,7)$

$B = \sum m(3,5,6,7)$

Q7.



X	Y
0	1
1	0

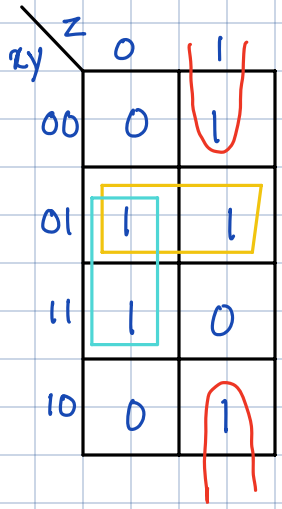
Q2.

	A_1	A_0		B_1	B_0	F	G	H
0	0	0	0	0	0	0	1	0
0	0	0	1	0	1	0	0	1
0	0	0	2	1	0	0	0	1
0	0	0	3	1	1	0	0	1
1	0	1	0	0	0	1	0	0
1	0	1	1	0	1	0	1	0
1	0	1	2	1	0	0	0	1
1	0	1	3	1	1	0	0	1
2	1	0	0	0	0	1	0	0
2	1	0	1	0	1	1	0	0
2	1	0	2	1	0	0	1	0
2	1	0	3	1	1	0	0	1
3	1	1	0	0	0	1	0	0
3	1	1	1	0	1	1	0	0
3	1	1	2	1	0	1	0	0
3	1	1	3	1	1	1	1	0

Q3.

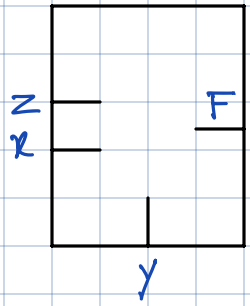
	x	y	z	A
0	0	0	0	0
1	0	0	1	1
2	0	1	0	1
3	0	1	1	1
4	1	0	0	0
5	1	0	1	1
6	1	1	0	1
7	1	1	1	0

$\bar{x}\,\bar{y}\,z$
$\bar{x}\,y\,\bar{z}$
$\bar{x}\,y\,z$
$x\,\bar{y}\,\bar{z}$
$x\,\bar{y}\,z$
$x\,y\,\bar{z}$
$x\,y\,z$



$F = \bar{y}z + \bar{x}y + \bar{y}z$

$= \bar{x}y + \bar{y}z$

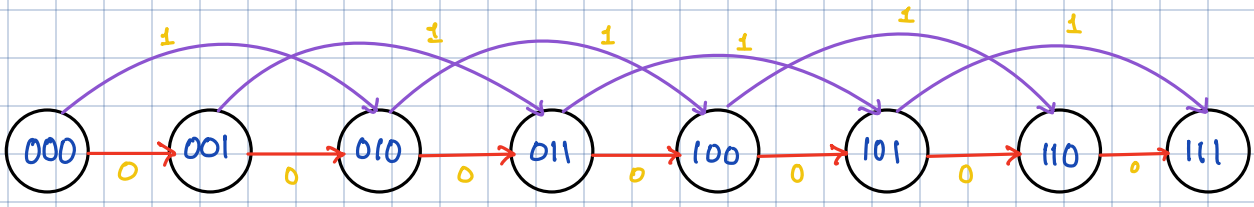


x	y	z	Y_7	Y_6	Y_5	Y_4	Y_3	Y_2	Y_1	Y_0
0	0	0								1
0	0	1							1	
0	1	0						1		
0	1	1					1			
1	0	0				1				
1	0	1			1					
1	1	0		1						
1	1	1	1							

z	x	y	F
0	1	0	x
1	0	1	z

$F = \bar{y}x + yz$

Q4.



State table

X	A_3	A_2	A_1	O_2	O_1	O_0	D_2	D_1	D_0
0	0	0	0	0	0	1			
0	0	0	1	0	1	0			
0	0	1	0	0	1	1			
0	0	1	1	1	0	0			
0	1	0	0	1	0	1			
0	1	0	1	1	1	0			
0	1	1	0	1	1	1			
0	1	1	1	X	X	X			
1	0	0	0	0	1	0			
1	0	0	1	0	1	1			
1	0	1	0	1	0	0			
1	0	1	1	1	0	1			
1	1	0	0	1	1	0			
1	1	0	1	X	X	X			
1	1	1	0	X	X	X			
1	1	1	1	X	X	X			

3. K-Map:

D_2

XA_3 \ A_2A_1	00	01	11	10
00	0	0	1	0
01	1	1	X	1
11	1	X	X	X
10	0	0	1	1

$$O_3 = A_3 + A_2A_1 + XA_2$$

D_1

XA_3 \ A_2A_1	00	01	11	10
00	0	1	0	1
01				
11				
10				

D_0

XA_3 \ A_2A_1	00	01	11	10
00				
01				
11				
10				