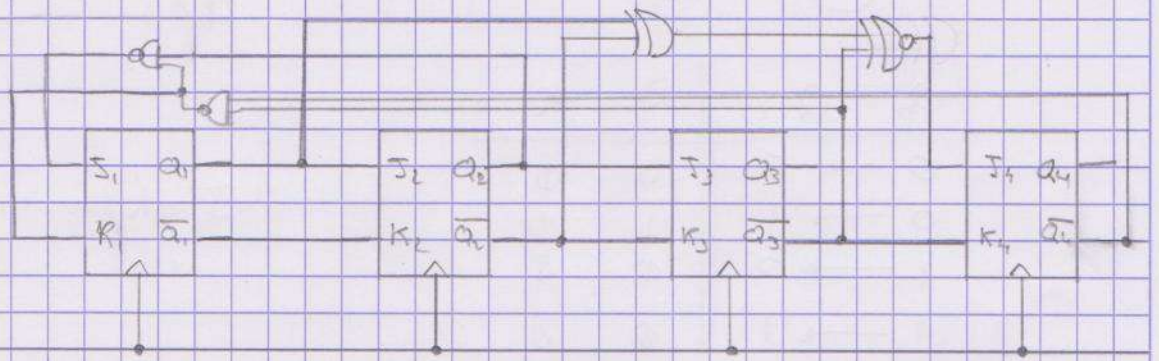


Exo 1

1)

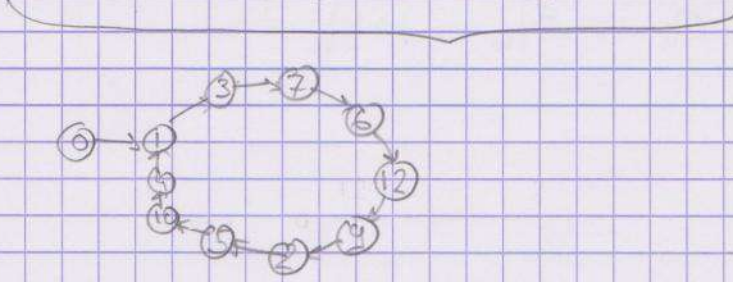
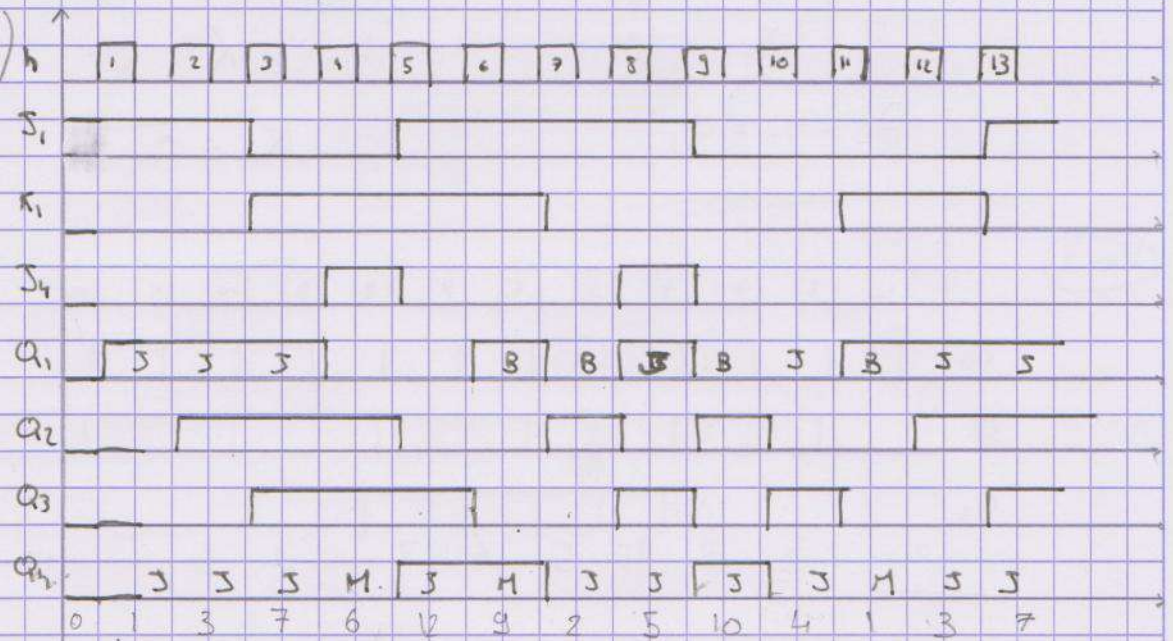


$$J_1 = \overline{a_2 + a_3} \cdot a_4 = a_2 \cdot \overline{a_3} \cdot a_4$$

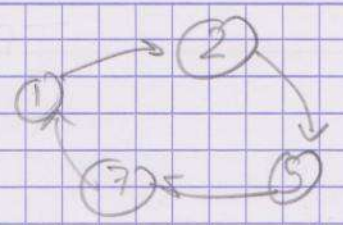
$$K_1 = \overline{a_3 + a_4} = \overline{a_3} \cdot \overline{a_4}$$

$$J_4 = \overline{a_1} a_2 a_3 + a_1 \overline{a_2} a_3 = a_3 (\overline{a_1} a_2 + a_1 \overline{a_2}) = \overline{a_3} + a_1 \oplus \overline{a_2}$$

2)



Exo 2



F_i

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

E_{i+1}

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

Q_i	Q_{i+1}	J	K
0	→ 0	0	0
0	→ 1	1	0
1	→ 0	0	1
1	→ 1	0	0

$J_1 = K_1 = 1$

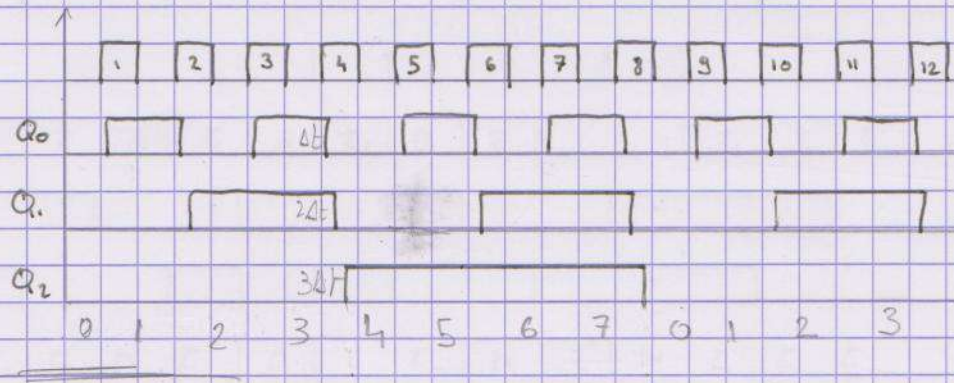
$Q_1 Q_0$	0	1
00	X	0
01	1	X
11	X	0
10	X	0

$J_2 = K_2 = Q_1$

$Q_1 Q_0$	0	1
00	X	1
01	0	X
10	X	0
11	X	0

$K_0 = \overline{Q_2}$

Exo 3



Exo 4

$Q_2 Q_1 Q_0 = 3 |_{10} = 101 |_2$