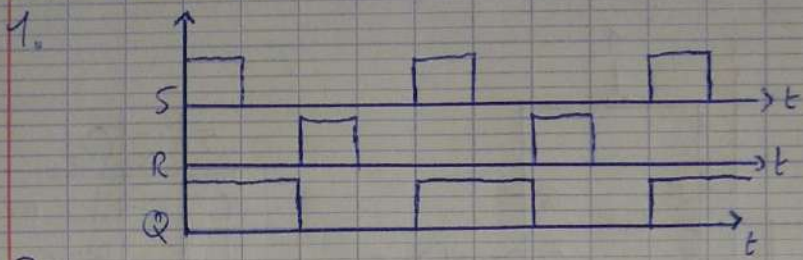
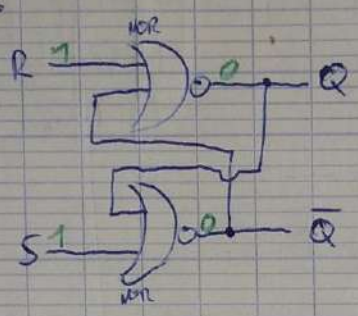


Exercice 1:



2.

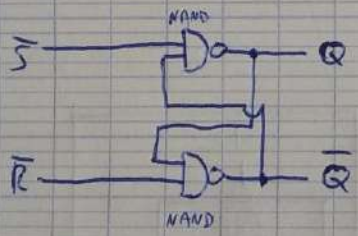


R	S	R+S	R+S-bar	Q
0	0	0	1	mém.
0	1	1	0	1
1	0	1	0	0
1	1	1	0	intérbt

S: mise à 1  
 $S=1 \Rightarrow Q=1$   
 R: mise à 0  
 $R=1 \Rightarrow Q=0$

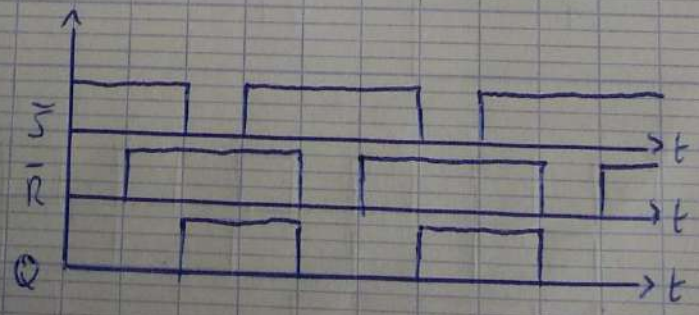
$R=S=1 \Rightarrow Q=Q-bar=0 \Rightarrow Q=Q-bar$   
 ce qui est impossible!

3.



R-bar	S-bar	R-bar S-bar	R-bar S	Q
0	0	0	1	intérbt
0	1	0	1	0
1	0	0	1	1
1	1	1	0	mém.

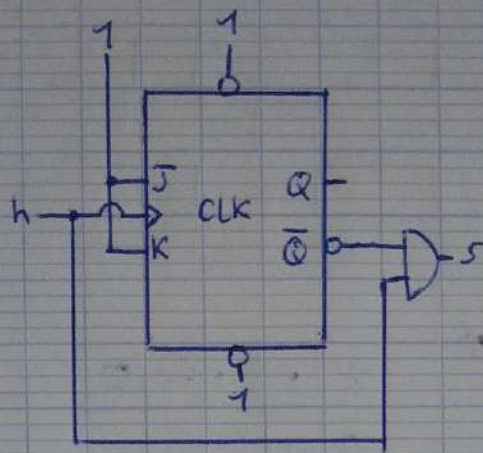
4.



5.

$R-bar = S-bar = 0$   
~~intérbt~~  
 $\Rightarrow Q = Q-bar = 1$   
 $\Rightarrow Q = Q-bar$   
 ce qui est impossible!

### Exercice 2 :

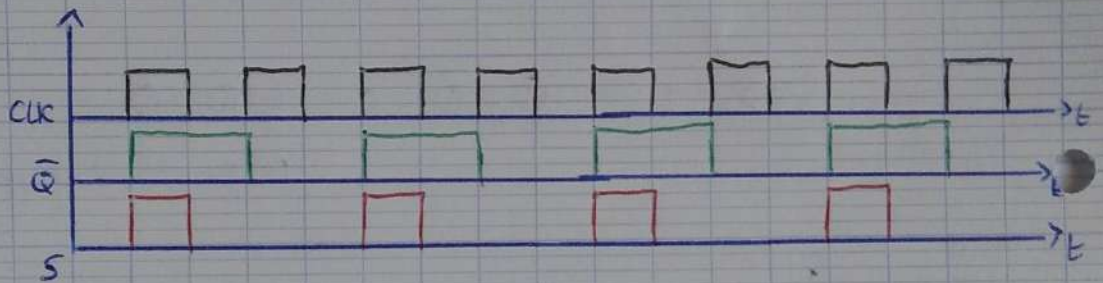


J	K	$Q_n$
0	0	$Q_{n-1}$ mémoire
0	1	0
1	0	1
1	1	$\overline{Q_{n-1}}$ bascule

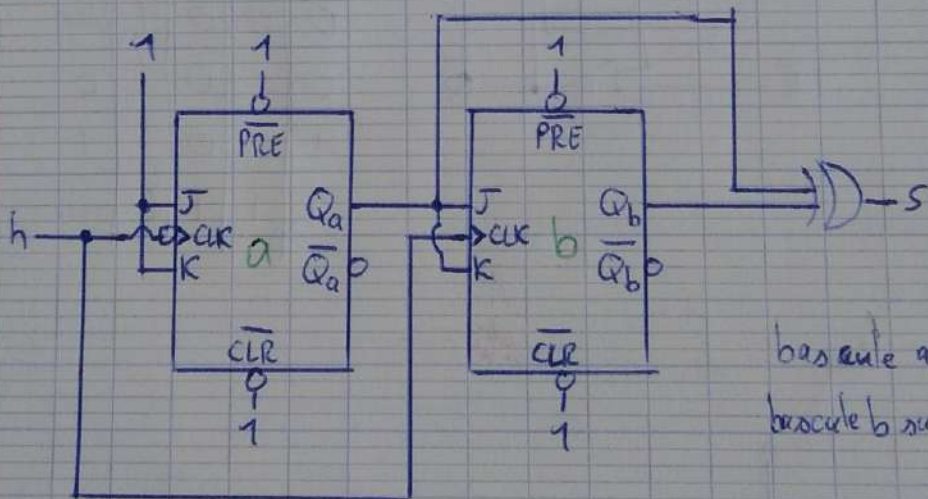
clk = clock

bascule sur front montant  $\uparrow$

4.

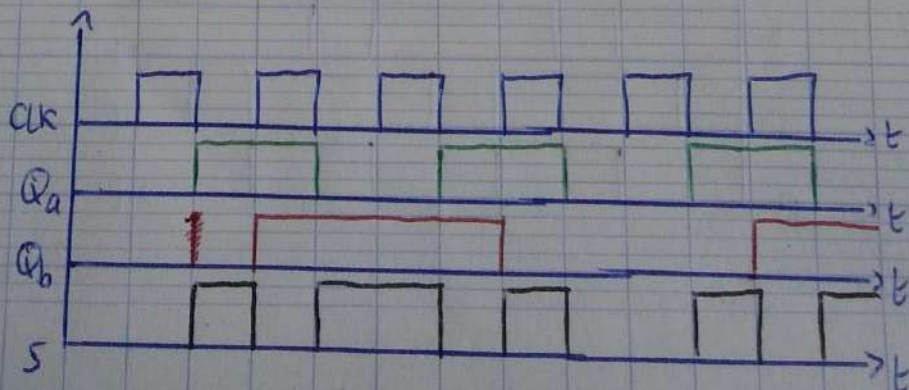


### Exercice 3 :



bascule a sur front descendant  $\downarrow$   
bascule b sur front montant  $\uparrow$

A	B	XOR
0	0	0
0	1	1
1	0	1
1	1	0

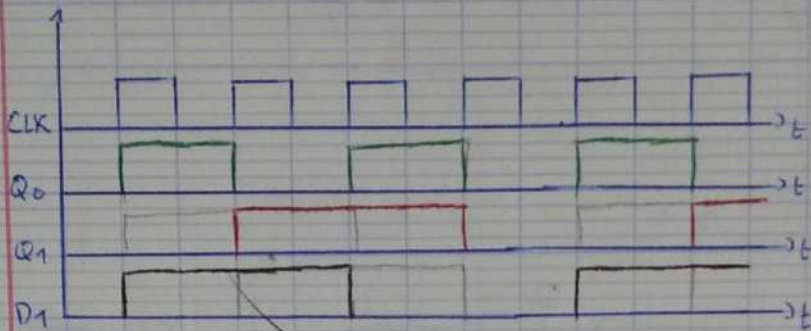


Exercice 5 :

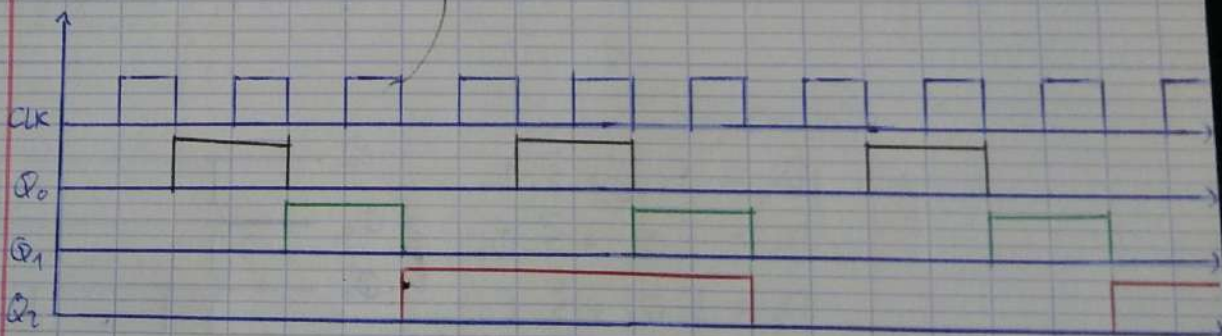
$$D_0 = \overline{Q_0}$$

$$\begin{aligned} 1) D_1 &= \overline{(Q_0, Q_1)} \\ &= (\overline{Q_0 \overline{Q_1}})(\overline{\overline{Q_0} Q_1}) \\ &= (Q_0 \overline{Q_1}) + (\overline{Q_0} Q_1) \\ &= Q_0 \oplus Q_1 \end{aligned}$$

2)



Exercice 6 :



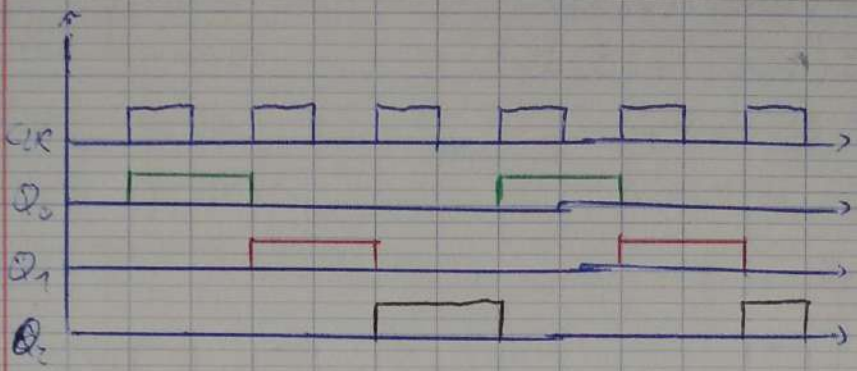
~~0 → 1 → 2 → 3 → 4 → 5 → 6 → 0~~

0 → 1 → 2 → 4 → 5 → 6 → 0

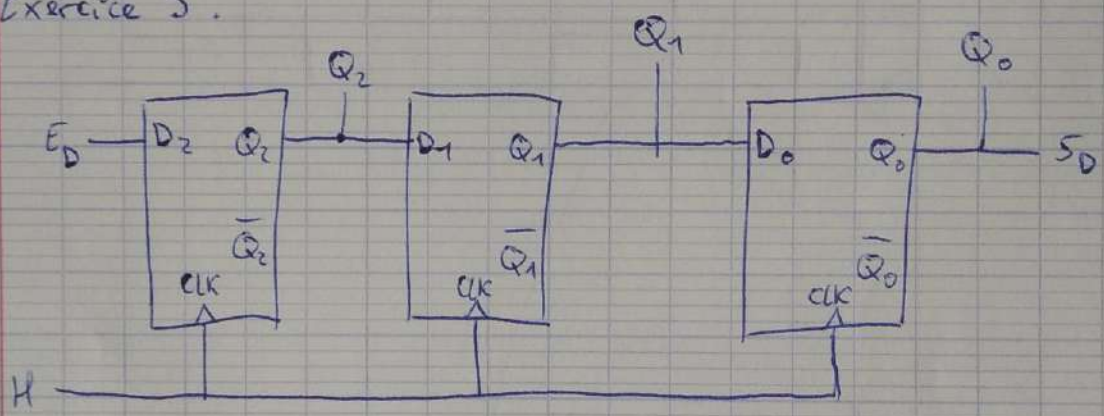
Appelé compteur modulo 6  
(bien qu'il compte jusqu'à 6)  
On compte cycliquement 6 états.

Exercice 1 :

$$D_0 = \bar{Q}_0 \bar{Q}_1 = \overline{Q_0 + Q_1}$$



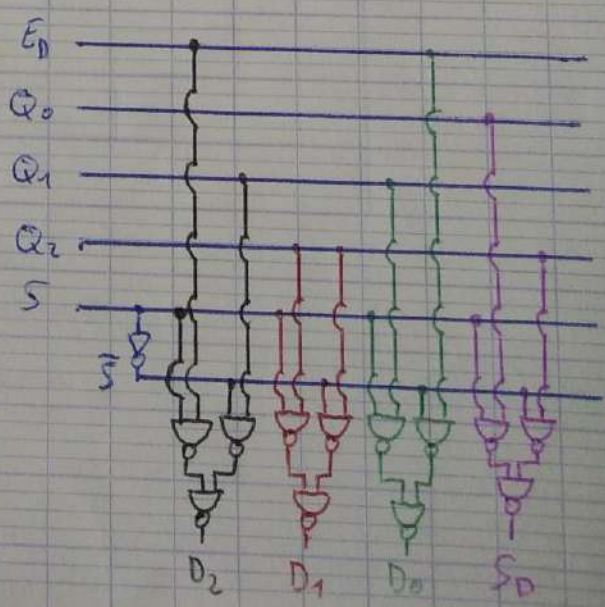
Exercice 3 :



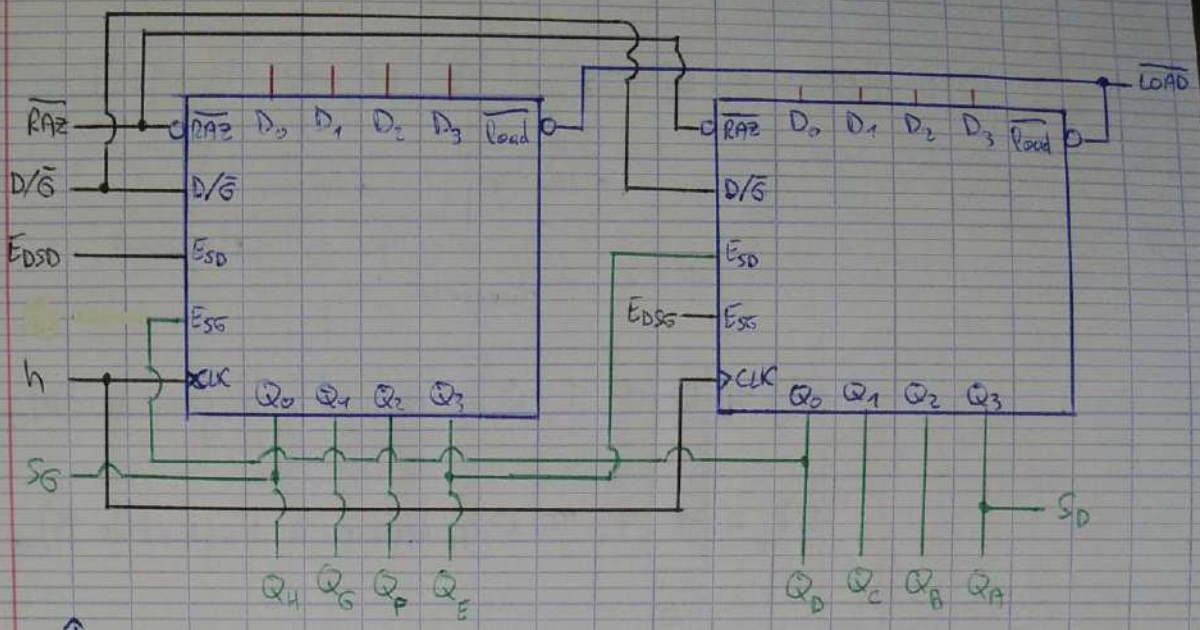
$S=1$  : décalage à droite  $D_2 = E_0 ; D_1 = Q_2 ; D_0 = Q_1$  et  $S_0 = Q_0$   
 $S=0$  : décalage à gauche  $S_0 = Q_2 ; D_2 = Q_1 ; D_1 = Q_0$  et  $D_0 = E_0$

En résumé :

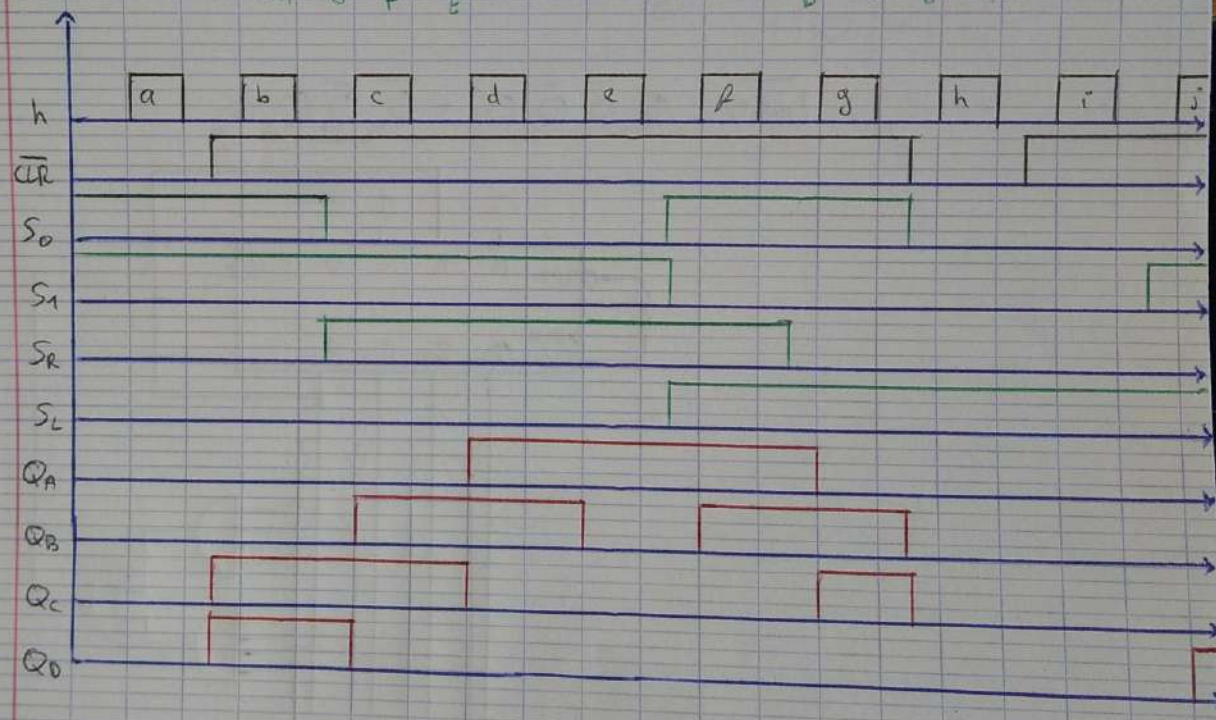
$$\begin{aligned}
 D_2 &= S \cdot E_0 + \bar{S} \cdot Q_1 \\
 D_1 &= S \cdot Q_2 + \bar{S} \cdot Q_0 \\
 D_0 &= S \cdot Q_1 + \bar{S} \cdot E_0 \\
 S_0 &= S \cdot Q_0 + \bar{S} \cdot Q_2
 \end{aligned}$$



Exercice 1 :



Exercice 2 :

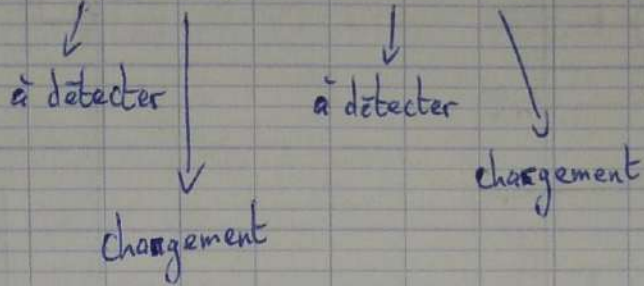


Exercice 3 :

h	Q <sub>D</sub>	Q <sub>C</sub>	Q <sub>B</sub>	Q <sub>A</sub>	Q <sub>h</sub>	RCO
1	0	0	0	0	0	0
16	1	1	1	1	15	0
17	0	0	0	0	0	1
18	1	1	0	1	13	0
19	1	1	1	0	14	0
20	1	1	1	1	15	0

# Exercice 4 :

[0, 1, 2, 3, 4, 5, 6, 10, 11, 12, 14, 15]

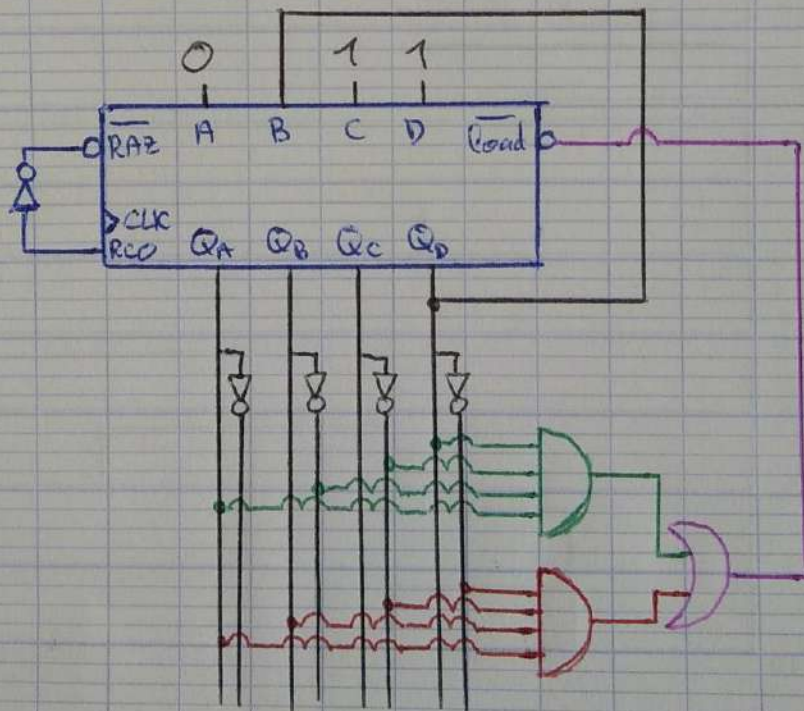


$6)_{10} = \boxed{0110}_2$  déclenche le chargement de  $10)_{10} = \boxed{1010}$

$12)_{10} = \boxed{1100}_2$  déclenche le chargement de  $14)_{10} = \boxed{1110}$

$Q_D$

$$\overline{LOAD} = Q_D \overline{Q_C} \overline{Q_B} Q_A + \overline{Q_D} \overline{Q_C} Q_B Q_A$$



Exercice 2:

Pour compter jusqu'à 7 ( $(111)_2$ ), 3 bascules suffisent.

$(Q_2, Q_1, Q_0)$	$(Q_2, Q_1, Q_0)_{i+1}$
0 0 1	0 1 0
0 1 0	1 0 1
1 0 1	1 1 1
1 1 1	0 0 1

Rappel de la table de vérité d'une JK

$Q_i$	$Q_{i+1}$	J	K
0	0	0	X
0	1	1	X
1	1	X	0
1	0	X	1