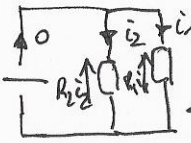
# Corrigé DM

**1)** Pour $t<0$ :

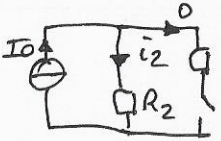



← Loi fct en continu

Donc $i_2 = -i_1$ (LdN), LdM $\Rightarrow R_2 i_2 = R_1 i_1 \Rightarrow \boxed{i_1 = i_2 = 0}$

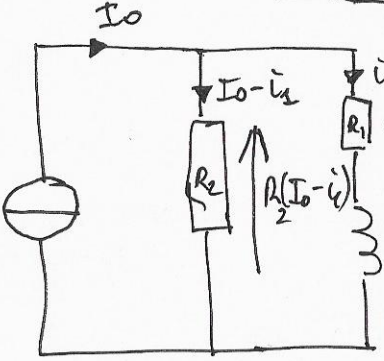
$i_1$ continue dans une bobine $\Rightarrow i_1(0^+) = i_1(0^-) = 0$

Pour $t = 0^+$ :




$\Rightarrow \boxed{i_2(0^+) = I_0}$

**2)**




LdM à droite :

$$R_2(I_0 - i_1) = R_1 i_1 + L\frac{di_1}{dt}$$

$$\Leftrightarrow \boxed{(1)\ \frac{di_1}{dt} + i_1\left(\frac{R_1+R_2}{L}\right) = \frac{R_2 I_0}{L}}$$

Donc $\boxed{\tau = \frac{L}{R_1+R_2}}$, en s.

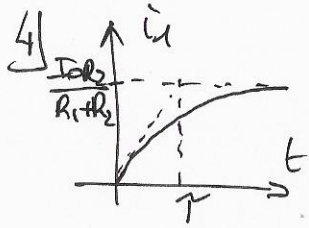
(Justification de l'unité : $\frac{di}{dt}$ en $A.s^{-1}$, donc $\frac{R_1+R_2}{L}$ en $s^{-1}$)

**3)** (1) a pour SG : $i_1 = \underbrace{Ae^{-t/\tau}}_{SH} + \underbrace{\frac{I_0 R_2}{R_1+R_2}}_{SP \text{ (pour } i_1 \text{ cst)}}$

On détermine A/CI :

$$i_1(0^+) \overset{CI}{=} 0 = A + \frac{I_0 R_2}{R_1+R_2} \Rightarrow \boxed{i_1 = \frac{I_0 R_2}{R_1+R_2}\left(1 - e^{-t/\tau}\right)}$$

**4)**



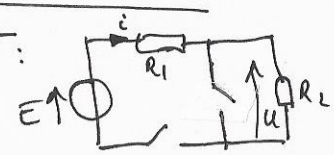

$\tau$ : odg de la durée du régime trans.

Rque : $i_{1\infty} = \frac{I_0 R_2}{R_1+R_2}$, se retrouve par 1 div courant :

# Conditions initiales en elec

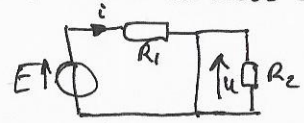
## Circuit 1

- $t \leq 0^-$ :



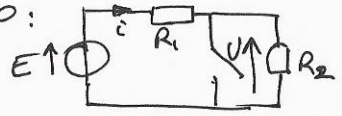

circuit ouvert ⇒ courants tous nuls ⇒ $i = 0$, $u = 0$ (loi d'ohm en $R_2$)

- $t = 0^+$ : condensateur ⇒ $u(0^+) = u(0^-) = 0$




$R_2$ court circuitée + Pouillet ou Ldn : $E = R_1 i + 0$ ⇒ $i = \frac{E}{R_1}$

- $t \to \infty$ :

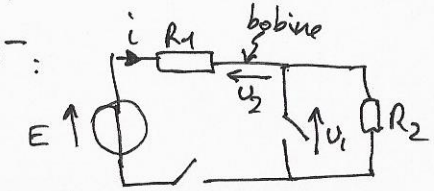



Pouillet : $i = \frac{E}{R_1 + R_2}$

DT (ou ohm) : $U = \frac{E R_2}{R_1 + R_2}$

## Circuit 2

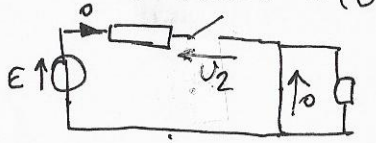
- $t \leq 0^-$ :




circuit ouvert, loi d'ohm ⇒ $i = 0$, $U_1 = 0 = U_2$

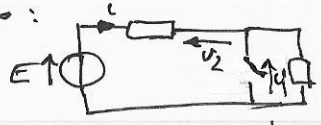
- $t = 0^+$ : condensateur : $U_1(0^+) = U_1(0^-) = 0$

bobine : $i(0^+) = i(0^-) = 0$




Ldn ⇒ $U_2(0^+) = E$.

- $t \to \infty$ :

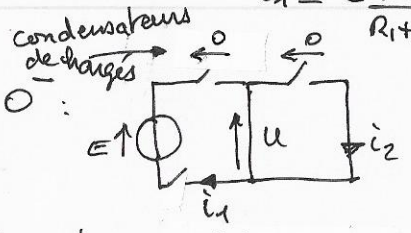



$i = E/R_1 + R_2$ (Pouillet)

$U_2 = 0$

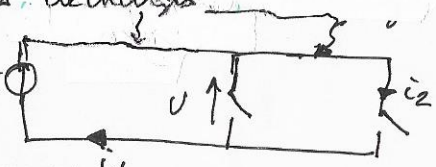
$U_1 = E \frac{R_2}{R_1 + R_2}$ (DT)

## Circuit 3




- $t \leq 0^-$ : circuit ouvert : $u = 0$, $i_1 = i_2 = 0$

- $t = 0^+$ . Condensateurs déchargés

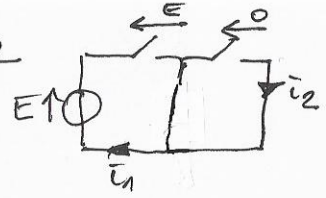



- bobine → $i_2(0^+) = 0$

circuit ouvert $i_1(0^+) = 0$

- Ldn ⇒ $U(0^+) = E$

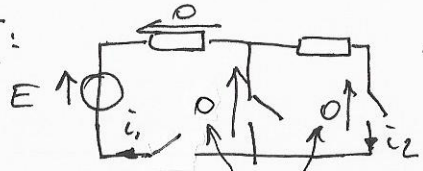
- $t \to \infty$ :




- circuit ouvert $i_1 = i_2 = 0$
- $u = 0$.
- 1 des 2 condensateurs est chargé.

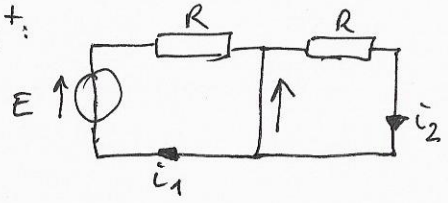
## Circuit 4

- $t \leq 0^-$ :



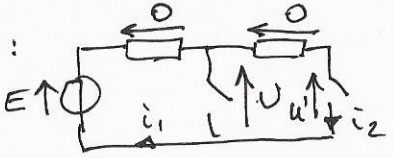

- circuit ouvert $i_1 = i_2 = 0$
- $u = 0$

- $t = 0^+$ :




- continuité dans C de la tension ⇒ $U = 0$
- branche 2 court circuitée ⇒ $i_2 = 0$
- Pouillet branche 1 : $i_1 = \frac{E}{R}$

- $t \to \infty$ :




- circuit ouvert $i_1 = i_2 = 0$
- Ldn à gauche : $U = E$

(• Ldn à droite $U' = E$)