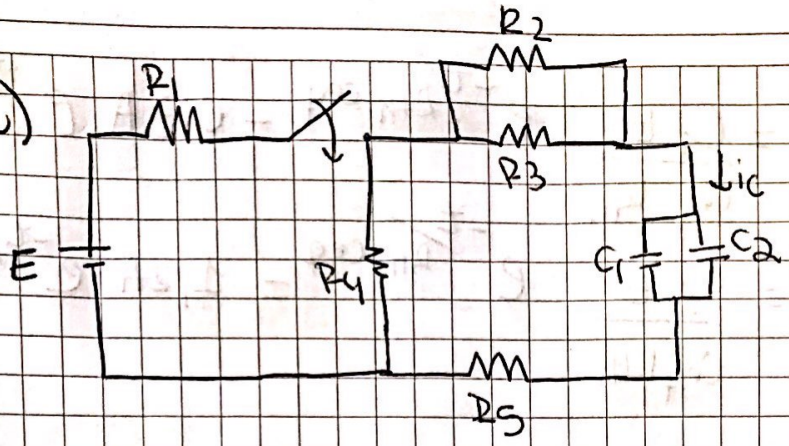
a)



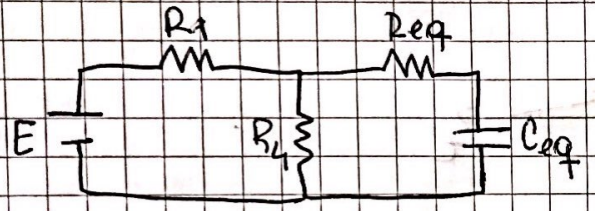
$E = 90V$ $R_1 = 30\Omega$

$R_2 = 80\Omega$ $R_3 = 20\Omega$

$R_4 = 60\Omega$ $R_5 = 4\Omega$

$C_1 = 10\mu F$ $C_2 = 40\mu F$

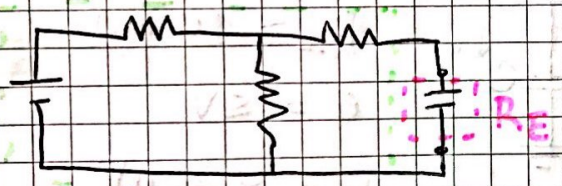
Primero simplifico el circuito:



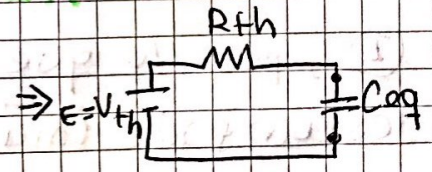
$$Req = \frac{R_2 R_3}{R_2 + R_3} + R_5 = 20\Omega$$

$$Ceq = C_1 + C_2 = 50\mu F$$

Ahora puedo aplicar thevenin:



- $R_{th} = \frac{R_1 R_4}{R_1 + R_4} + Req = 40\Omega$
- $Vth = 60\Omega \cdot \frac{90V}{3\Omega + 60\Omega} = 60V$



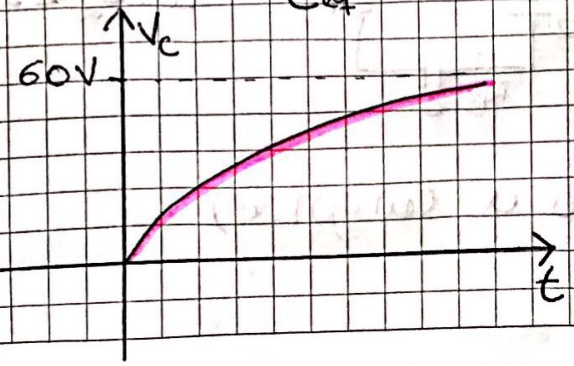
Donde

- $E = IR + \frac{Q}{C} = \frac{dQ}{dt} R_{th} + \frac{Q}{ceq}$

$$\Rightarrow Q = E \cdot Ceq\left(1 - e^{\frac{-t}{R_{th} Ceq}}\right)$$

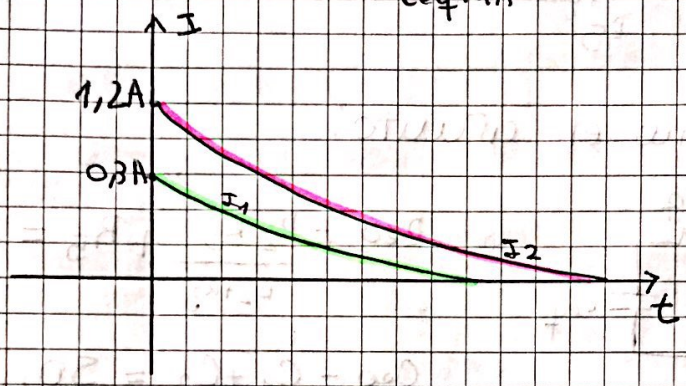
Entonces:

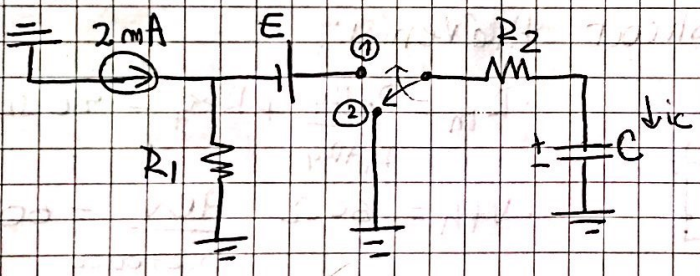
- $V_{ceq} = V_{C1} = V_{C2} = \frac{Q}{Ceq} = E\left(1 - e^{\frac{-t}{R_{th} \cdot Ceq}}\right) = 60V\left(1 - e^{\frac{-t}{40\Omega \cdot 50\mu F}}\right)$



Asamblea

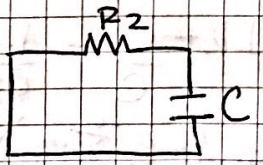
- $I_{C_1} = \frac{dQ}{dt} = C_1 \frac{dV}{dt} = \frac{C_1 E}{C_{eq} \cdot R_{th}} \cdot e^{-t/R_{th} C_{eq}} = 0{,}3A \cdot e^{-t/2\,ms}$
- $I_{C_2} = \frac{dQ}{dt} = C_2 \frac{dV}{dt} = \frac{C_2 E}{C_{eq} R_{th}} \cdot e^{-t/R_{th} C_{eq}} = 1{,}2A \cdot e^{-t/2ms}$



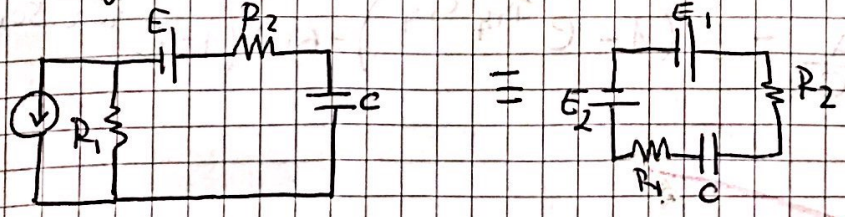
e) 

$R_1 = 15k\Omega$
$R_2 = 10K\Omega$
$E = 5V$
$C = 0{,}22\mu F$

Primero la llave está en ②, por lo que C está descargado inicialmente



Luego se coloca la llave en ①:



con $E_2 = 2mA \cdot R_1$

(El capacitor comienza a cargarse)

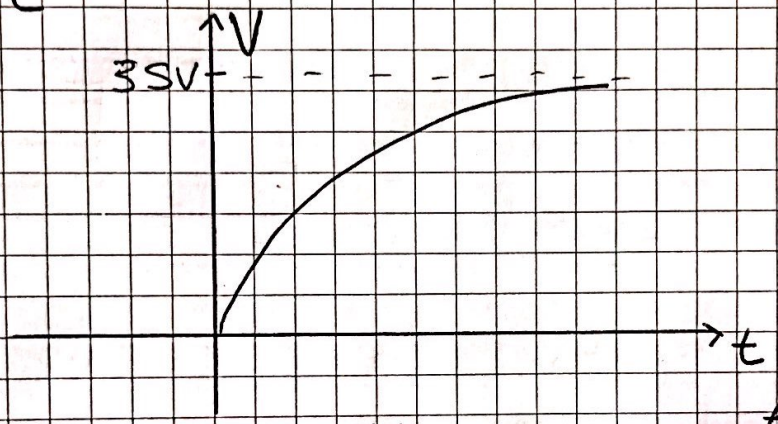
Asamblea

Donde $E = \frac{Q}{C} + \frac{dQ}{dt} R$

$\Rightarrow Q = CE \cdot (1 - e^{-t/RC})$

Entonces

- $V_c = \frac{Q}{C} = E(1 - e^{-t/RC}) = (5V + 30V)\cdot(1 - e^{-\frac{t}{25k\Omega \cdot 0{,}22\mu F}})$



- $I_c = \frac{dQ}{dt} = \frac{E}{R} \cdot e^{-t/RC} = \frac{35V}{25k\Omega} \cdot e^{-t/25k\Omega \cdot 0{,}22\mu F}$