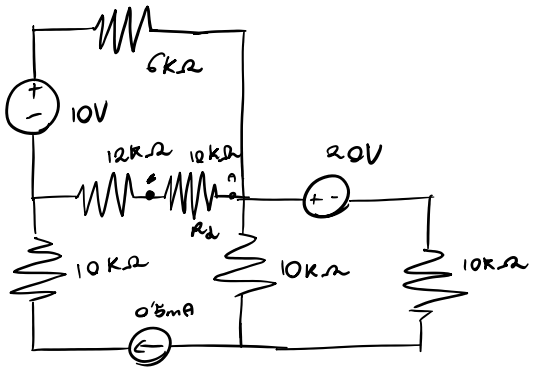
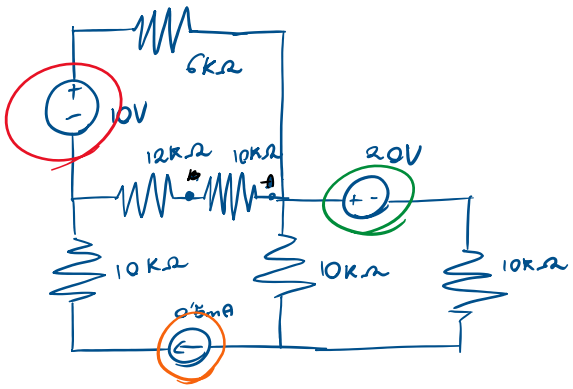
# Problemas II

jueves, 3 de febrero de 2022 11:10

90.-

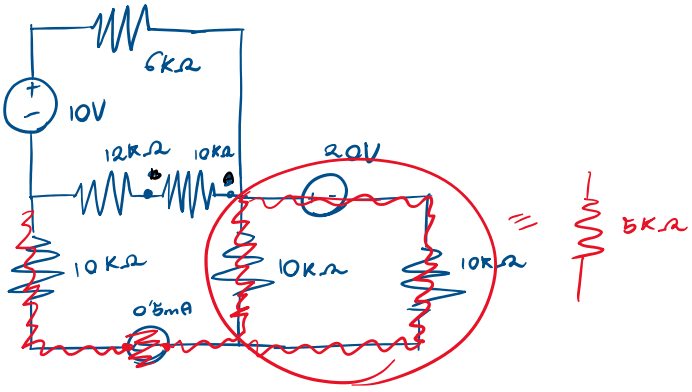



a) $\mathcal{I}_{AB}$ y $V_{AB}$



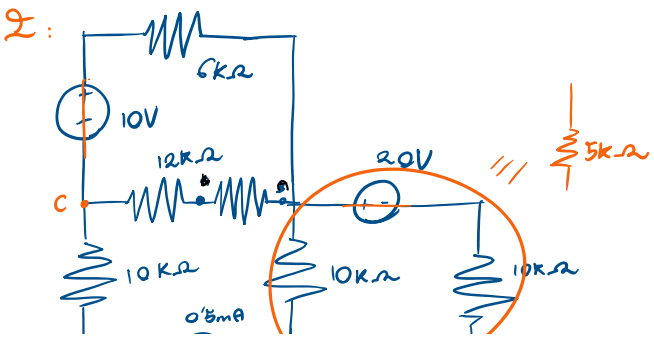

Por superposición:

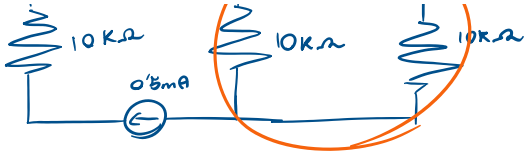
$V_1$:




$$\mathcal{I}_{AB} = \mathcal{I} = \frac{V}{R} = \frac{10}{28 \cdot 10^3} = 0'36\ mA$$

$\mathcal{I}$:

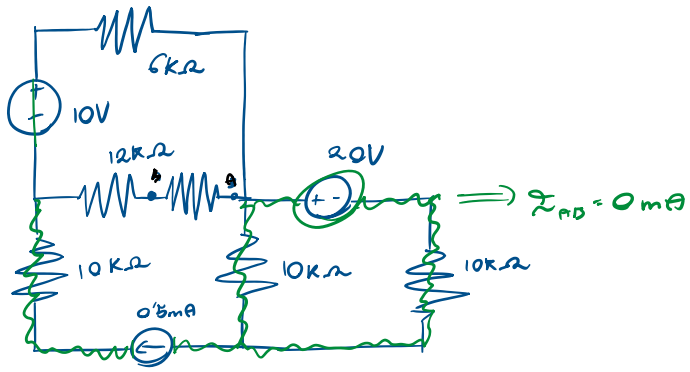





$I_{AB} = \frac{V_{CB}}{22K\Omega} \Rightarrow V_{CB} = I \cdot (22\|16)K\Omega = 0'5 \cdot 4'71\,K\Omega$

$V_{CB} = 2'36V \Rightarrow I_{AB} = 0'11\,mA$

$V_x$ :



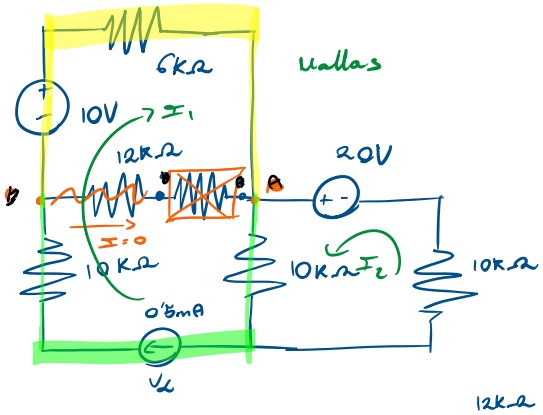

$\Rightarrow I_{AB} = 0\,mA$

Luego $I_{AB} = 0'36 - 0'11 = 0'25mA$

$V_{AB} = 0'25mA \cdot 10K\Omega = 2'5V$

($10K\Omega \hookrightarrow R_L$)

b) Eq. Th y N ($R_L$ de carga)




$R_{Th}$ : Anulamos fuentes $\Rightarrow$ 


$R_{Th} = 18K\Omega$

$V_{Th} = V_{AB}$

Por mallas : $\begin{cases} \text{Malla 1}: V_x + 10V = I_1(26)K\Omega + I_2(10)K\Omega \\ \text{Malla 2}: 20V = I_2(20)K\Omega - I_1(10)K\Omega \end{cases}$

$\begin{cases} V_x + 10 = 26\cancel{I_1}^{0'5} + 10I_2 \\ 20 = 20I_2 + 10\cancel{I_1}^{0'5} \end{cases}$ $(I_1 = 0'5mA)$

$\begin{cases} V_x + 10 = 13 + 10I_2 \Rightarrow V_x = 10'5V \\ 20 = 20I_2 + 5 \Rightarrow I_2 = \frac{15}{20} = 0'25mA \end{cases}$

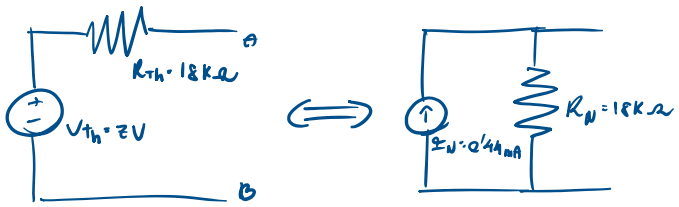
Por el camino señalado

$V_A + \mathcal{I}_1 \cdot (6)K\Omega - 10V = V_B \Longleftrightarrow V_A - V_B = 7V$

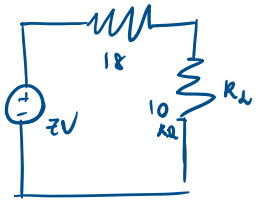
Por el camino señalado

$V_B + (\mathcal{I}_1 + \mathcal{I}_2)\,10k\Omega - V_2 + \mathcal{I}_1 \cdot 10k\Omega = V_A$

$V_A - V_B = 12'5V - 10'5V + 5V = 7V = R_{Th}$



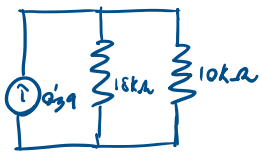

b) Comprueba




$\mathcal{I} = \frac{7}{28} = 0'25mA$

$V_{R_L} = 0'25 \cdot 10 = 2'5V$

} Coincide

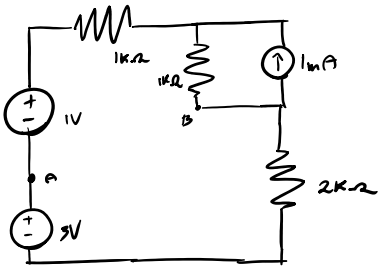



$V_{R_L} = 0'39 \cdot (18 \| 10) \simeq 2'5V$

$\mathcal{I}_{R_L} = \frac{2'5}{10} = 0'25mA$

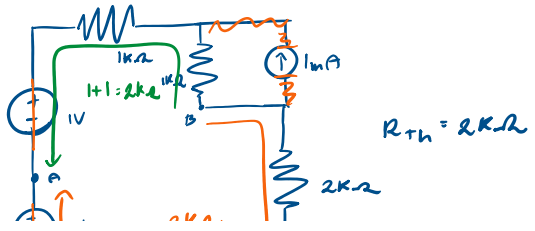
} Coincide

9Z.-

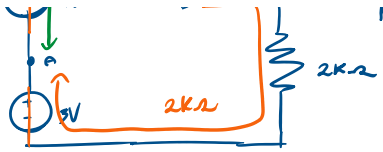



a) $\mathcal{I}_{q.Th}$

$R_{Th}$: anulamos fuentes

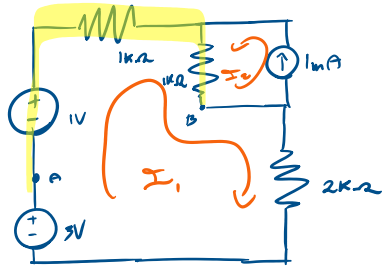



$R_{Th} = 2K\Omega$




$R_{Th} = 2K\Omega$

$V_{Th}$:




Por mallas $\begin{cases} \text{Malla 1}: 5+1 = I_1(4) + I_2(1) \\ \text{Malla 2}: V_\alpha = I_2(1) - I_1(1) \end{cases}$

$(I_2) = 1mA$

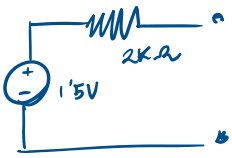
$\begin{cases} 4 = 4I_1 + 1 \Rightarrow I_1 = 0'75mA \\ V_\alpha = 1 + I_1 \Rightarrow V_\alpha = 1'75V \end{cases}$

Por el camino señalado

$V_A + 1 - I_1 - (I_1 + I_2) = V_B \Rightarrow V_A - V_B = 2I_1 + I_2 - 1$

$V_{AB} = 1'5V$

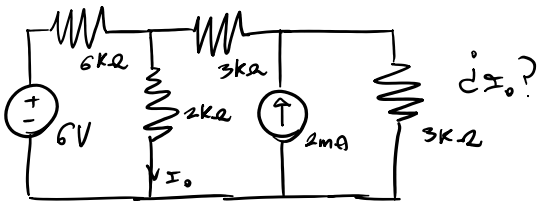
Luego:




b) $P_I$ $\quad P_I = V_\alpha \cdot I = 1'75V \cdot 1mA = 1'75mW$

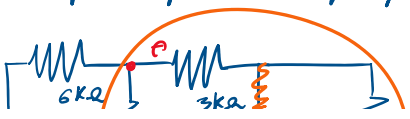
Se comporta como fuente ya que su sentido coincide con el de la corriente de la rama. También que $V_\alpha > 0$.

11O.-

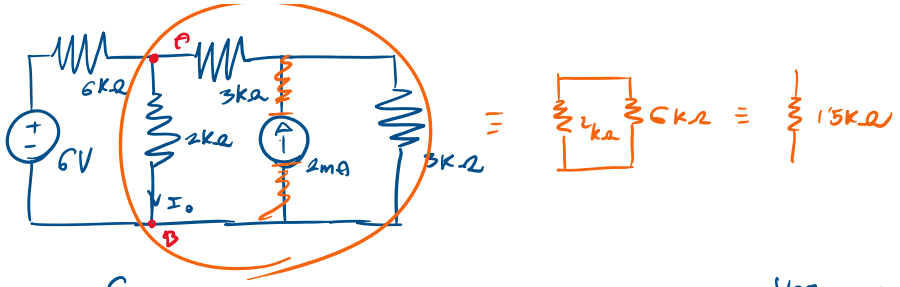



Por el principio de superposición

V:

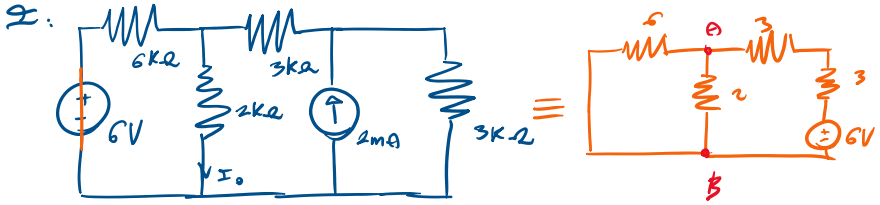


V:




$\mathcal{I} = \frac{6}{6+1'5} = 0'8\,mA \Rightarrow V_{AB} = 0'8 \cdot 1'5 = 1'2V \Rightarrow \mathcal{I}_0 = \frac{V_{AB}}{2} = 0'6\,mA$

$\mathcal{I}$:




$\mathcal{I} = \frac{6}{6+1'5} = 0'8 \Rightarrow V_{AB} = 0'8 \cdot 1'5 = 1'2V$

$\mathcal{I}_0 = \frac{V_{AB}}{2} = 0'6\,mA$

Con lo que $\mathcal{I}_0 = 0'6 + 0'6 = 1'2\,mA$

114: $i(t) = 2te^{-4t}$ 50mH

a) ¿$v(t)$?

$$v(t) = 2\frac{di(t)}{dt} = 2\left(2e^{-4t} - 8te^{-4t}\right) = 0'1(1-4t)e^{-4t}\,(V)$$

b) max $i(t)$

$$\frac{di(t)}{dt} = 2(1-4t)e^{-4t} \Rightarrow (1-4t)\cancel{e^{-4t}}^{\text{nunca } =0} = 0 \Rightarrow 1-4t = 0 \Rightarrow t = 0'25$$

Comprobamos

$$\frac{d^2i(t)}{dt} = 2\left(-4(1-4t)e^{-4t} + (-4)e^{-4t}\right) = -8(2-4t)e^{-4t}$$

$$i''(0'25) = -8(2-1)e^{-1} = -\frac{8}{e} < 0 \Rightarrow i(t) \text{ max en } t = 0'25s$$

c) min en $v(t)$

$$\frac{dv(t)}{dt} = -0'8(2-4t)e^{-4t} \qquad 1-2t = 0 \Rightarrow t = 0'5s$$

$$v''(0'5) = 0'43 > 0 \Rightarrow v(t) \text{ mín en } t = 0'5s$$