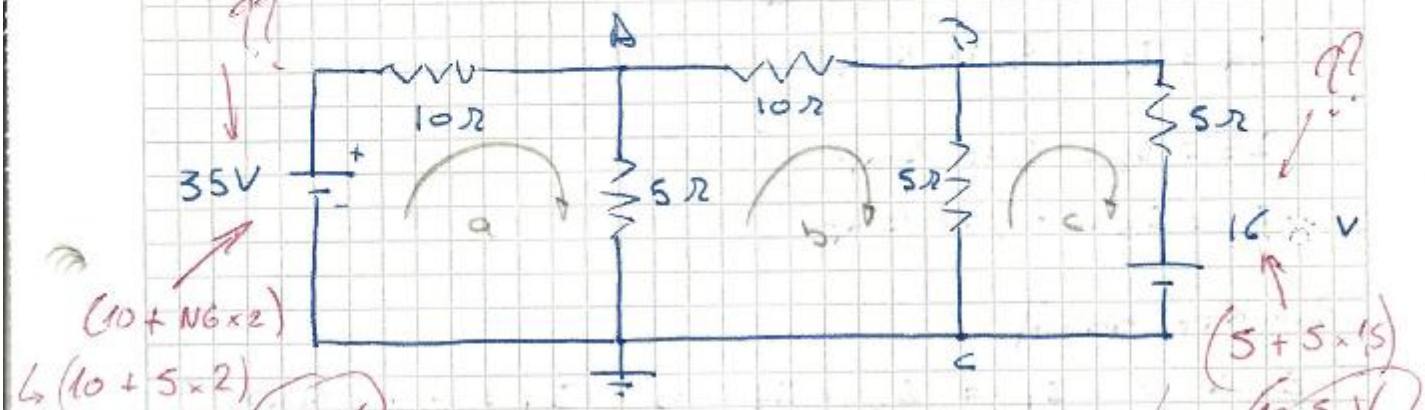
Ejercicio nº 1

Resolver por método de las mallas



$$\Sigma E_a = I_a \cdot R_{aa} + I_b \cdot R_{ab} + I_c R_{ac}$$

$$\Sigma E_b = I_a \cdot R_{ab} + I_b \cdot R_{bb} + I_c \cdot R_{ab}$$

$$\Sigma E_c = I_a \cdot R_{ac} + I_b \cdot R_{bc} + I_c \cdot R_{cc}$$

$$35 = I_a (10+5) + I_b \, -5 + I_c \, 0$$

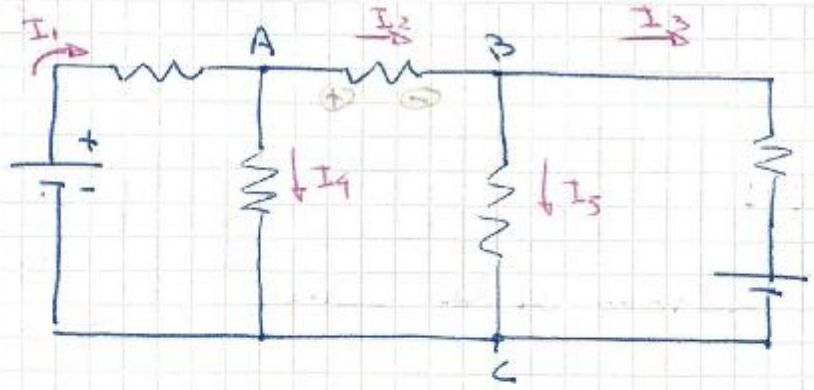
$$0 = I_a \, -5 + I_b \, 20 + I_c \cdot -5$$

$$-16 = I_a \, 0 + I_b \, -5 + I_c \, 10$$

$$\begin{vmatrix} 35 \\ 0 \\ -16 \end{vmatrix} = \begin{vmatrix} 15 & -5 & 0 \\ -5 & 20 & -5 \\ 0 & -5 & 10 \end{vmatrix} \cdot \begin{vmatrix} I_a \\ I_b \\ I_c \end{vmatrix} \Rightarrow \begin{array}{l} I_a = 2,41 \\ I_b = 0,23 \\ I_c = -1,48 \end{array}$$

↳ Sentido opuesto al tomado

NOTA



$I_a = I_1 = 2,41$ Amp

$I_b = I_2 = 0,23$ Amp

$I_c = I_3 = -1,48$ Amp

Por Kirchhoff

En A : $I_1 = I_2 + I_4 \Rightarrow I_4 = 2,18$ Amp

En B : $I_2 = I_3 + I_5 \Rightarrow I_5 = 1,71$ Amp

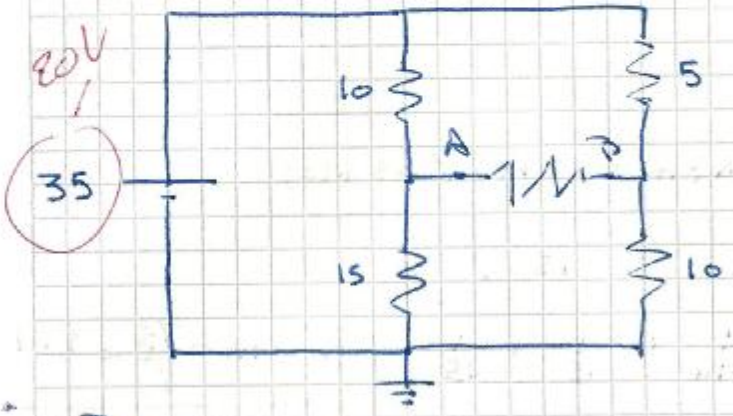
- Caida de Tension entre los nodos A y B

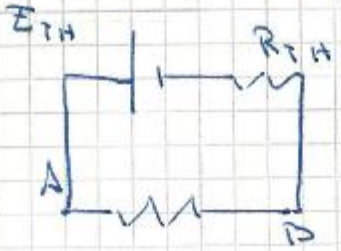
$$V_{A-B} = -I_2 \cdot R = -(0,23\,A \cdot 10\,\Omega)$$

$$V_{A-B} = -2,3\,V$$ ✓

Ejercicio nº 2

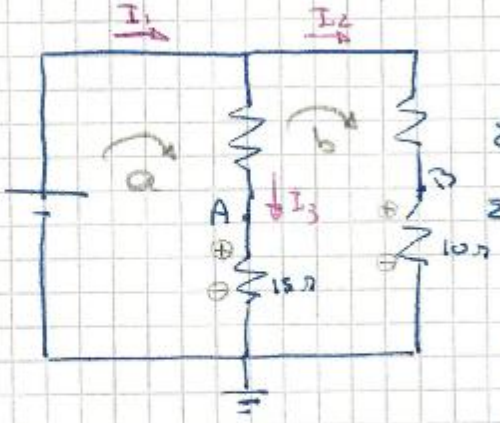
Resolver por Thévenin





- $E_{TH} = (V_A - V_B)$

obtenemos las corrientes del circuito Resto



Por mallas

$\Sigma I_a = I_a \cdot R_{aa} + I_b \cdot R_{ab}$

$\Sigma I_b = I_a \cdot R_{ab} + I_b \cdot R_{bb}$

$35 = I_a \cdot 25 + I_b \cdot -25$

$0 = I_a \cdot -25 + I_b \cdot 40$

$$\begin{vmatrix} 35 \\ 0 \end{vmatrix} = \begin{vmatrix} 25 & -25 \\ -25 & 40 \end{vmatrix} \cdot \begin{vmatrix} I_a \\ I_b \end{vmatrix} \Rightarrow$$

$I_a = 3,73$ Amp $= I_1$

$I_b = 2,33$ Amp $= I_2$

$1,43$ Amp $= I_3$

$I_1 = I_2 + I_3 \Rightarrow$

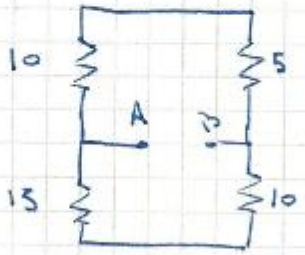
NOTA

$$E_{TH} = (V_A - V_B) = + I_2 \cdot 10\Omega - I_3 \cdot 15\Omega$$

$$= 2,33 \cdot 10 - 1,43 \cdot 15$$

$$= 1,85\ V$$

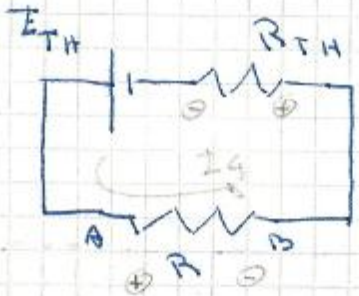
- Calculamos la R_{TH}



$$R_{TH} = (10+5) \,//\, (15+10)$$

$$= 15 \,//\, 25$$

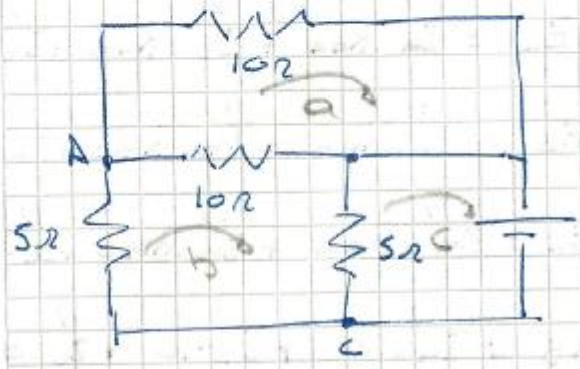
$$\frac{1}{R_{TH}} = \frac{1}{15} + \frac{1}{25} \Rightarrow R_{TH} = \frac{75}{8} \approx 9,37\Omega$$



Ejercicio 3

Resolver por el teorema de la superposición

Estado 1



Por mallas

$$\Sigma E_a = I'_a \cdot R_{aa} + I'_b \cdot R_{ab} + I'_c \cdot R_{ac}$$

$$\Sigma E_b = I'_a \cdot R_{ba} + I'_b R_{bb} + I'_c R_{bc}$$

$$\Sigma E_c = I_a \cdot R_{ca} + I_b \cdot R_{cb} + I_c \cdot R_{cc}$$

$$0 = I'_a \cdot 20 + I'_b \cdot -10 + I'_c \cdot 0$$

$$0 = I'_a \cdot -10 + I'_b \cdot 20 + I'_c \cdot -5$$

$$-16 = I'_a \cdot 0 + I'_b \cdot -5 + I'_c \cdot 5$$

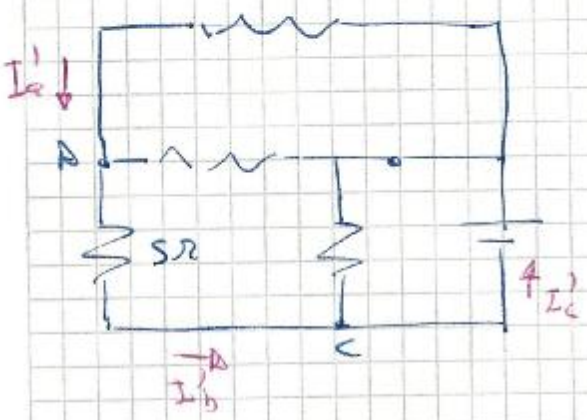
$$\begin{vmatrix} 0 \\ 0 \\ -16 \end{vmatrix} = \begin{vmatrix} 20 & -10 & 0 \\ -10 & 20 & -5 \\ 0 & -5 & 5 \end{vmatrix} \cdot \begin{vmatrix} I'_a \\ I'_b \\ I'_c \end{vmatrix}$$

$I'_a = -8$

$I'_b = -1,6$

$I'_c = -4,8$

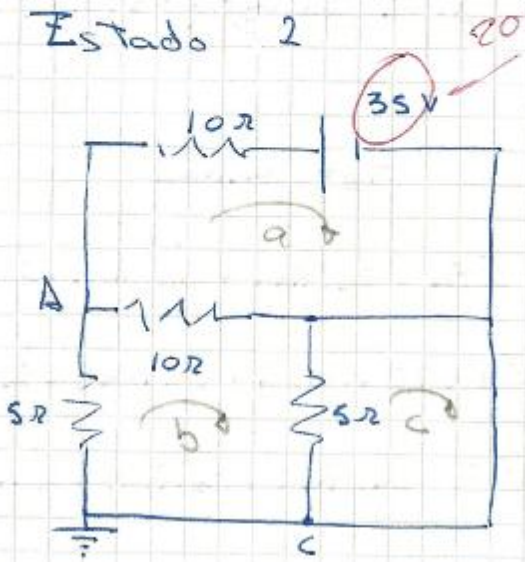
Nos queda



NOTA

Resolver por el teorema de la superposición

Estado 2



Por mallas

$$\Sigma E_a = I_a'' \cdot R_{aa} + I_b'' \cdot R_{ab} + I_c'' R_{ac}$$

$$\Sigma E_b = I_a'' R_{ab} + I_b'' \cdot R_{bb} + I_c'' R_{cb}$$

$$\Sigma E_c = I_a'' \cdot R_{ac} + I_b'' \cdot R_{bc} + I_c'' \cdot R_{cc}$$

$$-35 = I_a'' \cdot 20 + I_b'' \cdot -10 + I_c'' \cdot 0$$

$$0 = I_a'' \cdot -10 + I_b'' \, 20 + I_c'' \cdot -5$$

$$0 = I_a'' \cdot 0 + I_b'' \cdot -5 + I_c'' \cdot 5$$

$$\begin{vmatrix} -35 \\ 0 \\ 0 \end{vmatrix} = \begin{vmatrix} 20 & -10 & 0 \\ -10 & 20 & -5 \\ 0 & -5 & 5 \end{vmatrix} \begin{vmatrix} I_a'' \\ I_b'' \\ I_c'' \end{vmatrix}$$

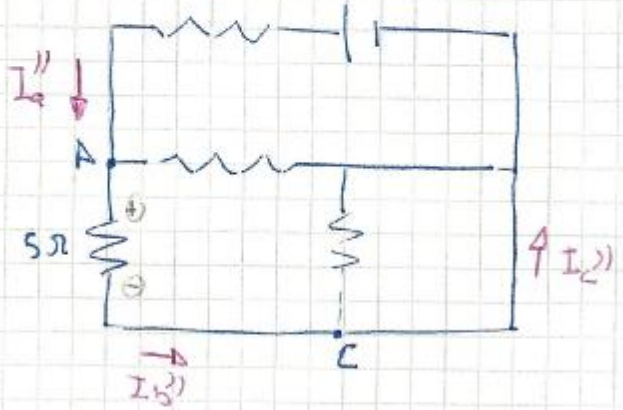
$I_a'' = -2,62$

$I_b'' = -1,75$

$I_c'' = -1,75$

↳ sentido opuesto al dibujado anteriormente

• Nos queda:



$I_a' + I_a'' = I_a$

$I_b' + I_b'' = I_b \Rightarrow 1,6 + 1,75 = I_b = 3,35\ A$?

$I_c' + I_c'' = I_c$

La caida de Tension entre los nodos D y C

$V_D - V_C = -3,35\ A \cdot 5\ \Omega = +16,75\ V_{dl}$ ✓