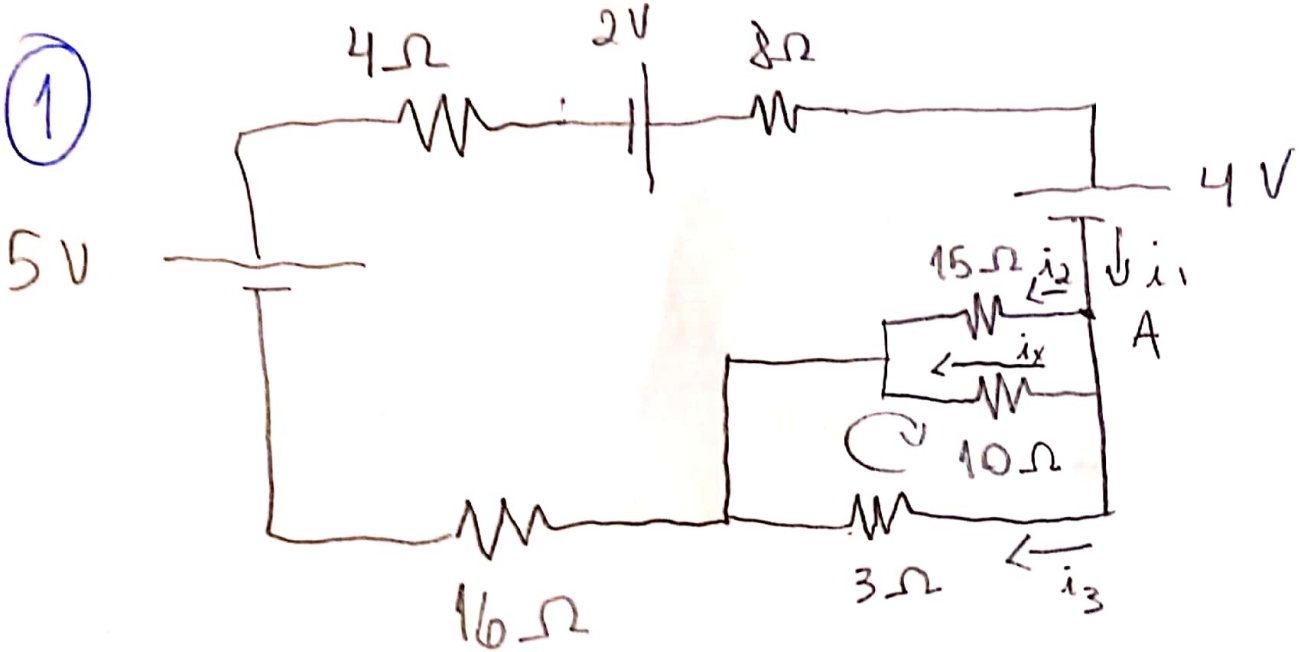
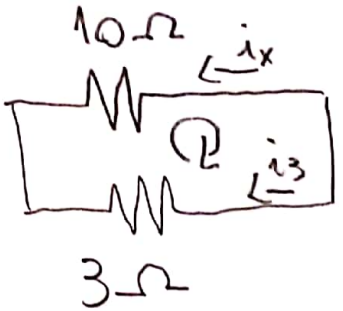
Luís Otávio Lopes Amorim - SP3034178 21/01/2021

(1)

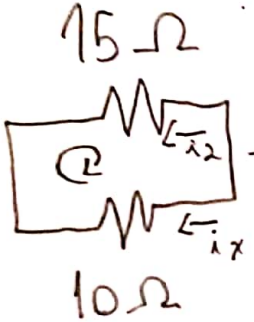


$$i_1 = i_2 + i_x + i_3 \quad (1)$$



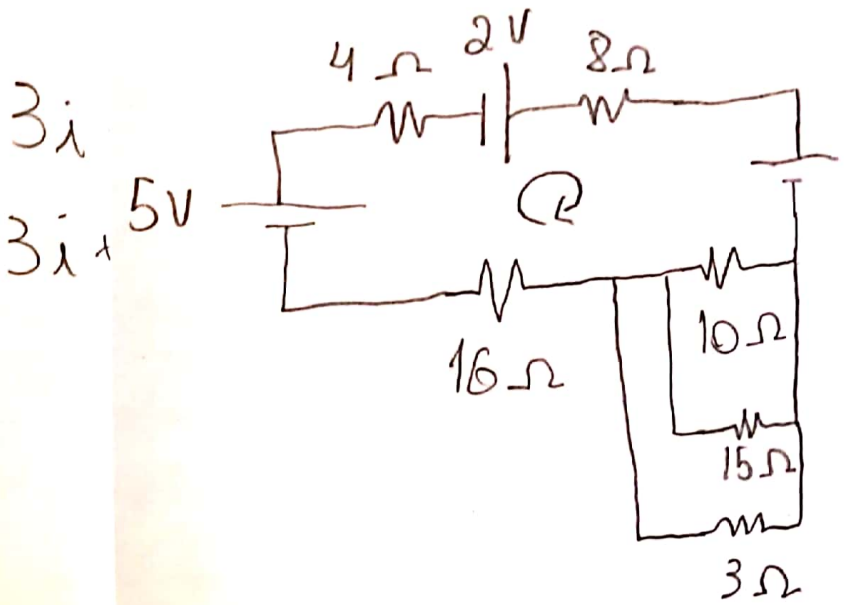
$$3i_3 - 10i_x = 0$$

$$i_3 = \frac{10 i_x}{3}$$



$$10i_x - 15i_2 = 0$$

$$i_2 = \frac{10 i_x}{15} = \frac{2 i_x}{3}$$



$$-5+4i_1-2+8i_1+4+10i_x+16i_1=0$$

$$28i_1+10i_x=3$$

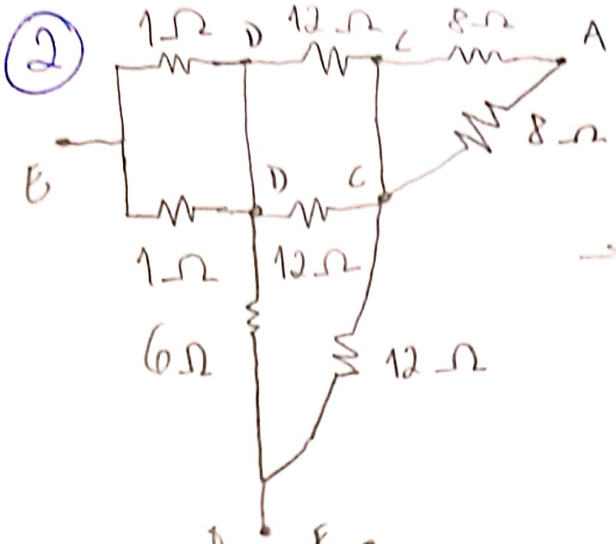
$$\boxed{i_1=\frac{3-10i_x}{28}}$$

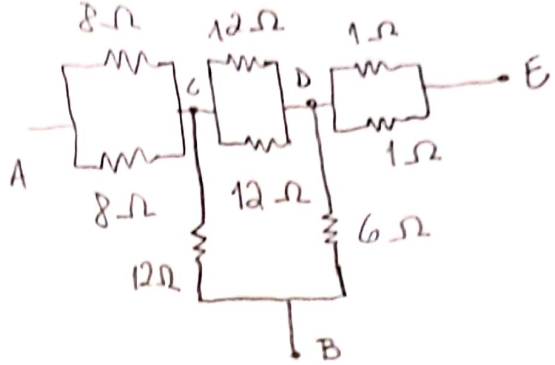
Da eq. 1:

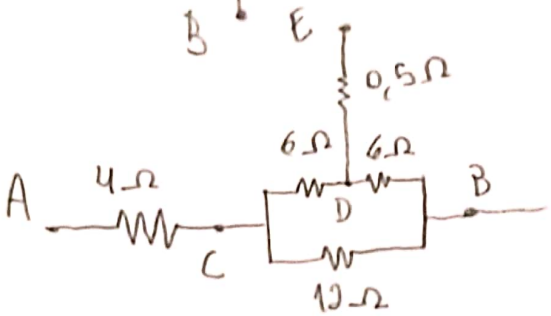
$$\frac{3-10i_x}{28}=\frac{2i_x}{3}+i_x+\frac{10i_x}{3}\Rightarrow\frac{3-10i_x}{28}=5i_x\Rightarrow 3-10i_x=140i_x\Rightarrow 150i_x=3$$

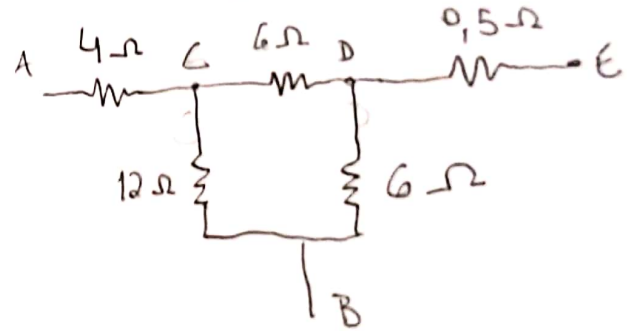
$$\boxed{i_x=\frac{1}{50}=0{,}02A=20mA}$$

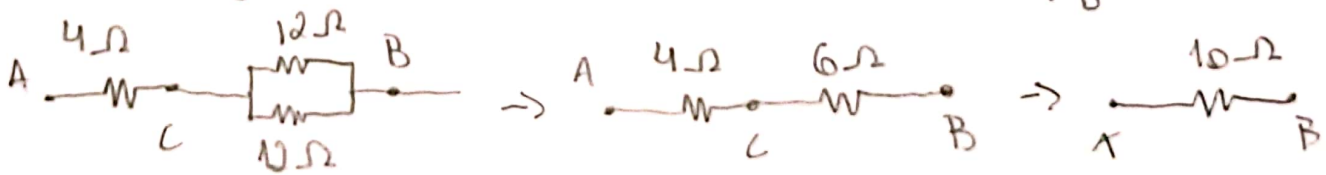
(2)





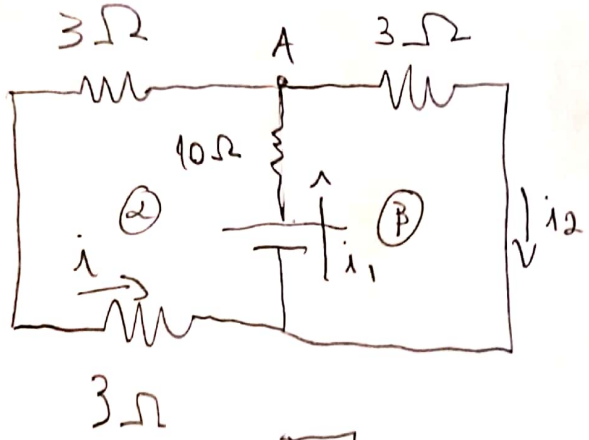






$$R_{eq} = 10\,\Omega$$

(3)



$\sum V_\alpha = 0 \Rightarrow 3i - 10 + 10i_1 + 3i = 0$

$6i + 10i_1 = 10$

$3i + 5i_1 = 5$

$\sum V_\beta = 0 \Rightarrow -10 + 10i_1 + 3i_2 = 0$

$10i_1 + 3i_2 = 0$

$\sum i_A = 0 \Rightarrow i_1 - i - i_2 = 0$

$i_2 \; i - i_1$

$10i_1 + 3(i - i_1) = 0$

$10i_1 + 3i - 3i_1 = 0$

$7i_1 + 3i = 0 \Rightarrow 3i = -7i_1$

$-7i_1 + 5i_1 = 5$

$-2i_1 = 5$

$i_1 = \frac{-5}{2}$

$3i + 5i_1 = 5$

$3i + 5\left(\frac{-5}{2}\right) = 5 \Rightarrow 3i - 12{,}5 = 5$

$3i = 17{,}5 \Rightarrow i = \frac{35}{6} = 5{,}83\ A$