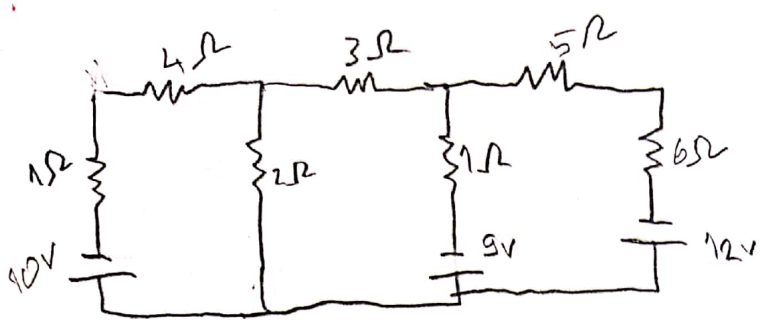
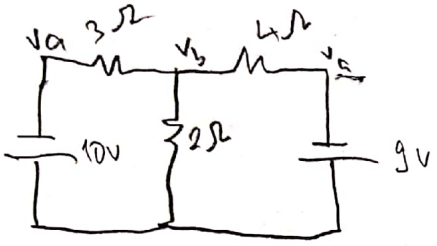
1)

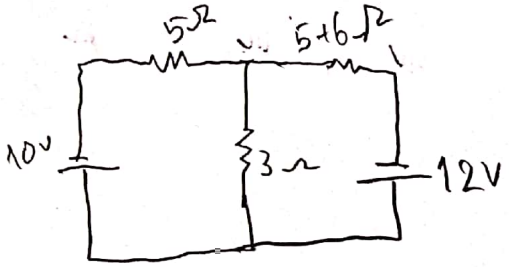




$$\frac{V_a - V_b}{4} + \frac{V_a - V_b}{5} = \frac{V_b}{2}$$

$$2 - \frac{V_b}{5} + 2{,}25 - \frac{V_b}{4} = \frac{V_b}{2}$$

$$V_b = \frac{4{,}25 \cdot 20}{19} \simeq 4{,}47\,V$$



$$\frac{V_a - V_b}{5} + \frac{V_a - V_b}{11} = V_b$$

$$\frac{2 - V_b}{5} + \frac{12 - V_b}{11} = V_b$$

$$\frac{34}{11} = \frac{71 V_b}{55} \Rightarrow V_b = \frac{34.55}{11.71}$$

$$V_b \simeq 2{,}4\,V$$

$\Rightarrow I_{1\Omega} = -0{,}8\,A$

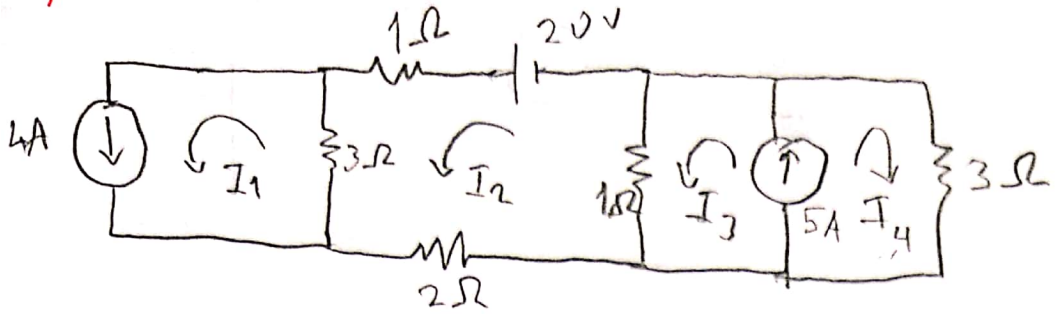
$I_{2\Omega} = 2{,}3\,A$

$I_{3\Omega} = -1{,}2\,A$

$I_{4\Omega} = 1{,}1\,A$

$I_{5\Omega} = 0{,}35\,A$

2)



$20 = 7I_2 - 3I_1 - I_3$

$4 = I_1 - I_2$

$5 = I_3 - I_2$

$$\det[I] = \begin{vmatrix} -3 & 7 & -1 \\ 1 & -1 & 0 \\ 0 & -1 & 1 \end{vmatrix} = 4 - 7 = -3$$

0 −3 7 −1 3

0 1 −1 0 1

7 0

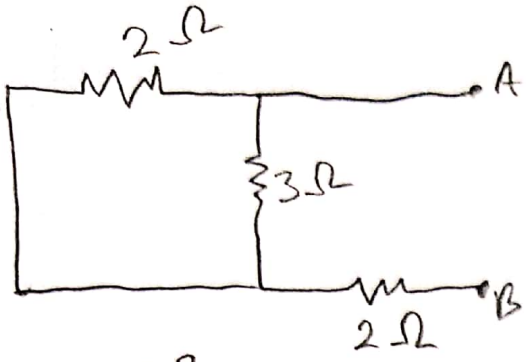
7 4

$$I_1 = \frac{\begin{vmatrix} 20 & 7 & -1 \\ 4 & -1 & 0 \\ 5 & -1 & 1 \end{vmatrix}}{-3} = \frac{-49}{-3} \approx 16,\overline{33}$$

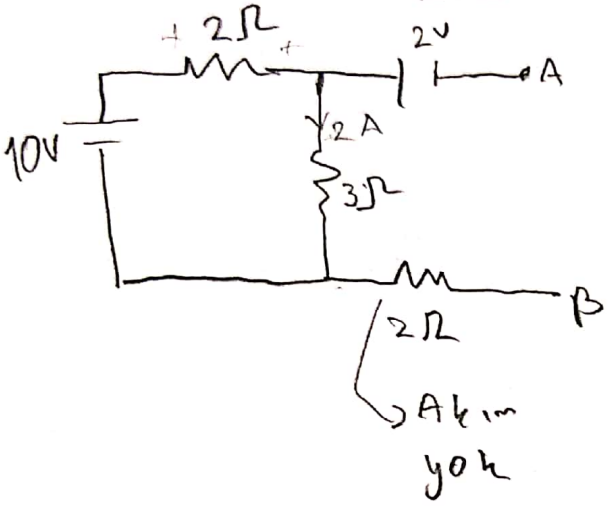
$$I_2 = \frac{\begin{vmatrix} -3 & 20 & -1 \\ 1 & 4 & 0 \\ 0 & 5 & 1 \end{vmatrix}}{-3} = 12,\overline{33}\ A$$

$V_{4\Omega} = 4 \cdot 12,3 = 36,6\ V$

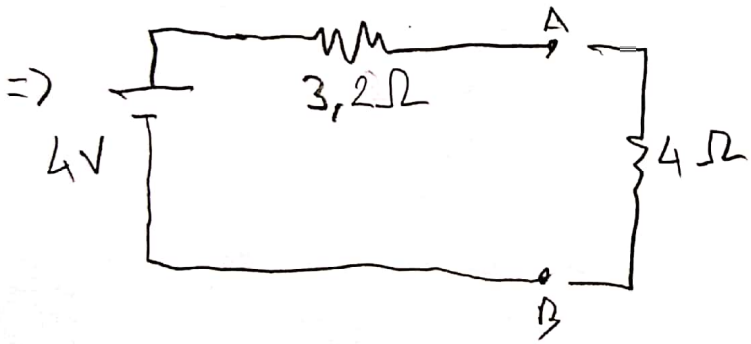
3)



$$R_{eş} = \frac{2 \cdot 3}{2+3} + 2 = 3{,}2\ \Omega$$



$$V_{eş} = 2 \cdot 3 - 2 = 4\ V$$



$$I_{4\Omega} = \frac{4}{7{,}2}$$

$$\Rightarrow I_{4\Omega} \cong 0{,}56A$$