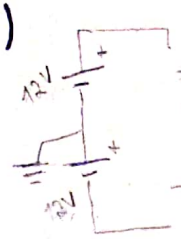
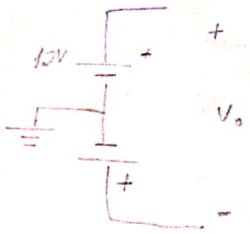
Eletrônica

1)

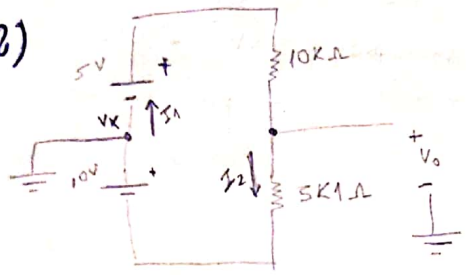


$V_o \rightarrow V_o = 12 + 12 = 24\,V$



$V_o = 12 - 8 = 4\,V$

2)



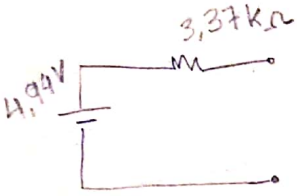
$V_o = I_1 - I_2$

$$\left(\frac{-V_o + 15}{10000}\right) - \left(\frac{V_o}{5100}\right) = 0$$

$$-V_o + 15 - 1{,}96V_o = 0$$

$$-2{,}96V_o = -15$$

$$V_o = 5{,}06\,V$$



$V_{Th} = V_o - V_2$

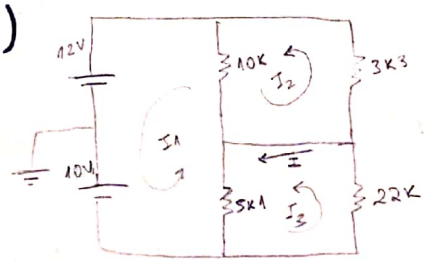
$V_{Th} = 5{,}06 - 10$

$V_{Th} = -4{,}94\,V$

$R_{Th} = 10K // 5K1$

$R_{Th} = 3{,}37K\Omega$

3)



$I = 1{,}87\,mA$

$I = I_3 - I_2 \qquad I = 1{,}87\,mA$

$\sum_{I_1} V = 0$

$$12 + 10 + 5100I_1 - 5100I_3 + 10000I_1 - 10000I_2$$

$$15100I_1 - 10000I_2 - 5100I_3 = -22$$

$\sum_{I_2} V = 0$

$$3300I_2 + 10000I_2 - 10000I_1 = 0$$

$$-10000I_1 + 13300I_2 = 0$$

$\sum_{I_3} V = 0$

$$22000I_3 + 5100I_3 - 5100I_1 = 0$$

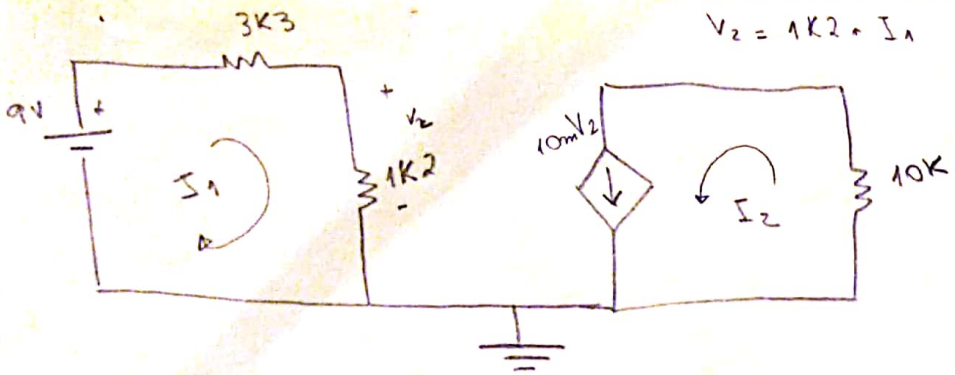
$$-5100I_1 + 27100I_3 = 0$$

$I_1 = -3{,}32\,mA$

$I_2 = -2{,}49\,mA$

$I_3 = -6{,}25 \times 10^{-4}\,A$

4)



$$\sum_{I_1} V_0$$

$$-9 + 3300 I_1 + 1200 I_1 = 0$$

$$4500 I_1 = 9$$

$$I_1 = 2 \times 10^{-3} \rightarrow 2\,mA$$

$$V_2 = 1200 \cdot 2 \times 10^{-3} = 2{,}4\,V$$

$$I_2 = 10m \cdot 2{,}4 = 24{,}0\,mA$$

$$V_3 = 10000 \cdot 24 \times 10^{-3} = 240\,V$$

5)