

$$I_1 = \frac{4}{12} \quad I_1 = \frac{1}{3} A$$

$$I_0 + I_1 = 1 + \frac{1}{3} = \frac{4}{3} \text{ A}$$

$$V_{AB} = \frac{4}{3} = 4V$$

$$V_{AC} = V_{AB} + 4$$

$$V_{AC} = 4 + 4 = 8V$$

$$I_2 = \underline{8} \text{ A}$$

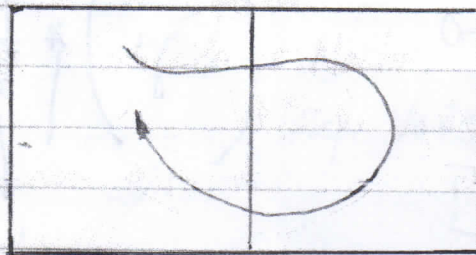
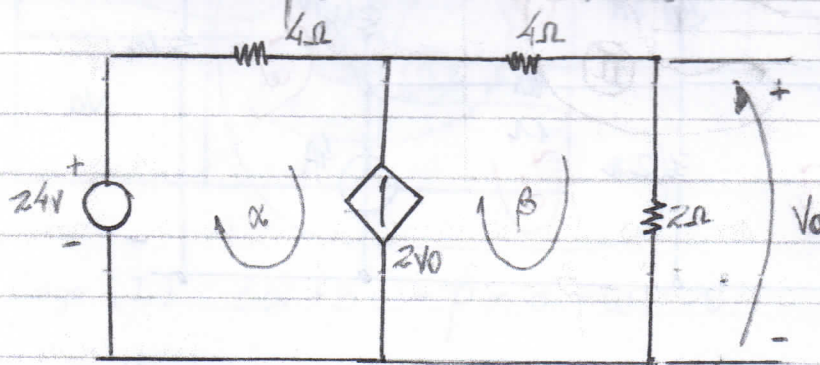
$$I = I_2 + I_0 + I_1$$

$$I = \frac{0}{\infty} + \frac{4}{3} \quad I = \frac{12}{3} = 4A$$

$I_0 = 1A$ ————— $I = 4A$
 $I_0 = ?$ ————— $16A$

$$I_0 = \frac{16}{4} = 4 \text{ A}$$

Determine V_o por análise de malha:



$$4\alpha + 6\beta = 24$$

$$\beta - \alpha = 2V_o$$

$$V_o = 2\beta$$

$$V = R \cdot I$$

$$V_o = 2\beta$$

$$\begin{cases} 4\alpha + 6\beta = 24 \\ \beta - \alpha = 2V_o \\ V_o = 2\beta \end{cases}$$

$$V_o = \dots -8V$$

$$4\alpha + 6\beta = 24$$

$$-\alpha + \beta = 4\beta$$

$$\beta - 4\beta = \alpha$$

$$\alpha = -3\beta$$

$$4(-3\beta) + 6\beta = 24$$

$$-12\beta + 6\beta = 24$$

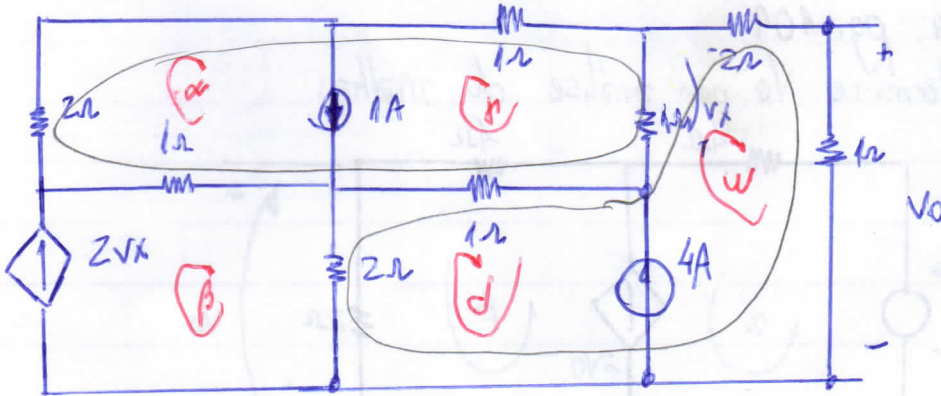
$$-6\beta = 24$$

$$\beta = \frac{24}{-6} = -4A$$

$$V_o = 2(-4)$$

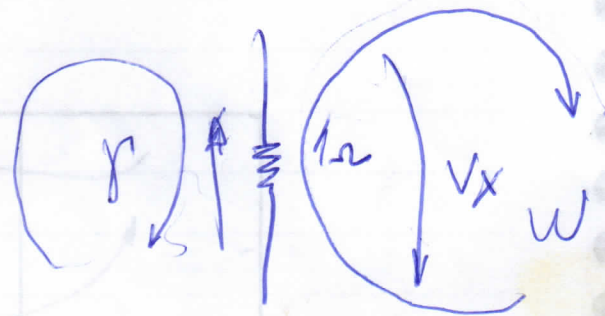
$$V_o = -8V$$

③ Determine V_o no need:



$$\begin{cases} V_o = 1 \cdot w \\ 3\alpha + 3\gamma - \beta - \delta - w = 0 \\ 3\delta + 4w - 2\beta - 2\gamma = 0 \end{cases}$$

$$\begin{cases} \alpha - \gamma = 1A \rightarrow \boxed{\alpha = 1 + \gamma} \\ w - \delta = 4A \rightarrow \boxed{w = 4 + \delta} \\ \beta = 2 \cdot V_x \\ V_x = 1 \cdot (w - \delta) \\ \boxed{\beta = 2w - 2\delta} \end{cases}$$



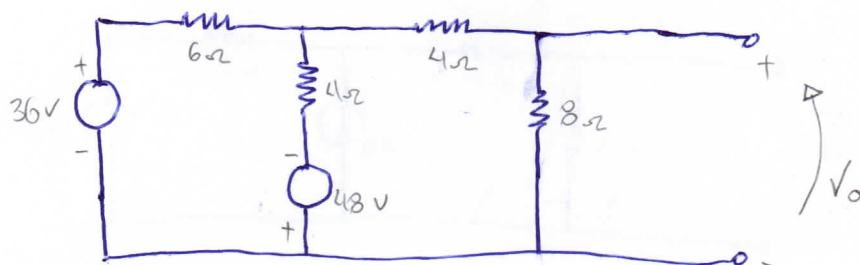
$$\begin{aligned} 3 \cdot (1 + \gamma) + 3\gamma - 2 \cdot (4 + \delta) + 2\delta - \delta - 4 - \delta &= 0 \\ 3 + 3\gamma + 3\gamma - 8 - 2\delta + 2\delta - \delta - 4 - \delta &= 0 \\ 8\gamma - 4\delta - 3 + 8 - 4 &= 0 \\ 8\gamma - 4\delta &= 9 \\ -4\delta &= 9 - 8\gamma \\ \boxed{\delta = \frac{-9 + 8\gamma}{4}} \end{aligned}$$

$$\begin{aligned} 3 \cdot \left(\frac{-9 + 8\gamma}{4} \right) + 4 \cdot (4 + \delta) - 2 \cdot (2w - 2\delta) - 2\delta &= 0 \\ -\frac{27}{4} + 24\gamma + 16 + 4 \cdot \left(\frac{-9 + 8\gamma}{4} \right) - 4w + 4\delta - 2\delta &= 0 \\ -\frac{27}{4} + 24\gamma + 16 - 9 + 8\gamma - 4 \cdot \left[4 + \left(\frac{-9 + 8\gamma}{4} \right) \right] + 4\delta - 2\delta &= 0 \\ -\frac{27}{4} + 24\gamma + 7 + 10\delta - 16 + 9 - 8\gamma &= 0 \\ -\frac{27}{4} + 24\gamma + 2\delta + 40\delta - 64 + 36 - 32\delta &= 0 \\ 32\delta &= 27 \end{aligned}$$

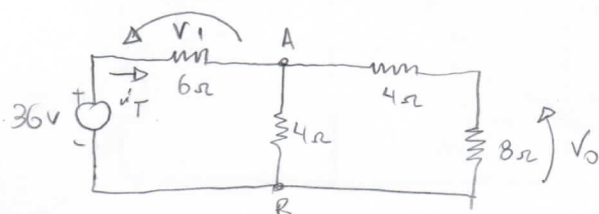
$V_o \approx 3.4V$

$\gamma = 0.843$

4) Por meio da superposição, calcule o valor de V_0 .



Influência de 36V



$$R_{eq} = \left[\left(\frac{4 \cdot 8}{4 + 8} \right) + 6 \right] = 9 \Omega$$

$$i_{TOT A} = \frac{36}{9} = i_{TOT A} = 4 A$$

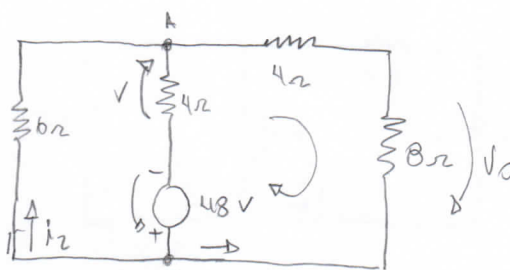
$$V_1 = 6 \cdot 4 = 24 V$$

$$V_{AB} = 36 - 24 = 12 V$$

$$i_2 = \frac{V_{AB}}{12} = \frac{12}{12} = 1 A$$

$$V_{01} = 1 \cdot 8 = 8 V //$$

Influência de 48V



$$R_{eq} = \left[\left(\frac{8 \cdot 4}{8 + 4} \right) + 4 \right] = 8 \Omega$$

$$i_{TOT A} = \frac{48}{8} = 6 A$$

$$V_1 = 4 \cdot 6 = 24 V$$

$$V_{AB} = 48 - 24 = 24 V$$

$$i_1 = \frac{24}{12} = 2 A$$

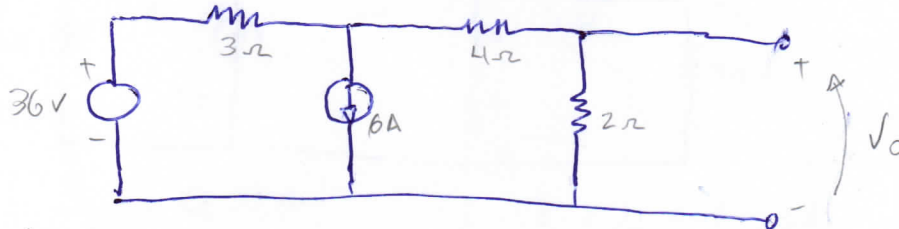
$$V_{02} = 2 \cdot 8 = 16 V //$$

$$V_0 = V_{01} - V_{02}$$

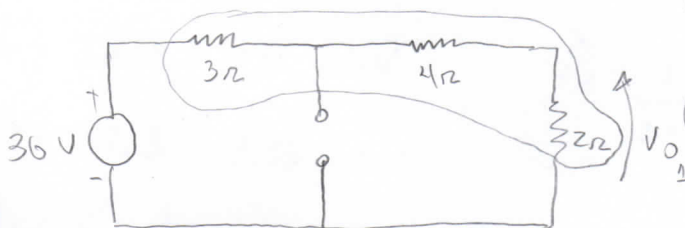
$$V_0 = 8 - 16$$

$$V_0 = -8 V //$$

5) Por meio da superposição, calcule o valor de V_o .



Influência da Fonte 36V

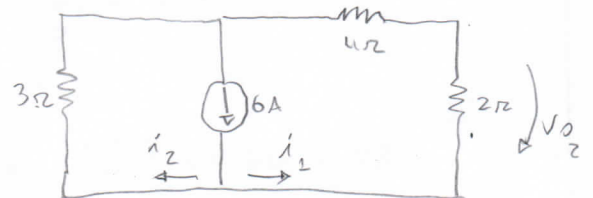


$$R_{eq} = 3 + 4 + 2 = 9\Omega$$

$$i = 4A$$

$$V_{o1} = 2 \cdot 4 = 8V //$$

Influência 6A



$$i_1 = \frac{3}{3+6} \cdot 6 = 2A$$

$$V_{o2} = 2 \cdot 2 = 4V //$$

$$V_o = V_{o1} - V_{o2}$$

$$V_o = 8 - 4$$

$$\underline{V_o = 4V //}$$