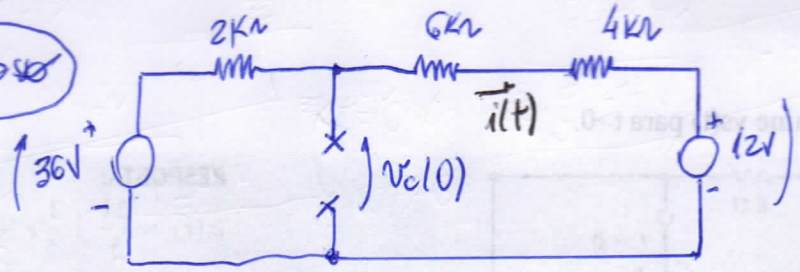
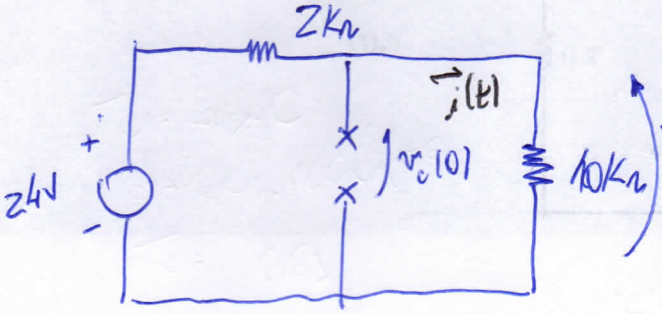
(3) 1º Passo $i(t) = K_1 + K_2 \cdot e^{-\frac{t}{\tau_c}}$

2º Passo

p/ t<0



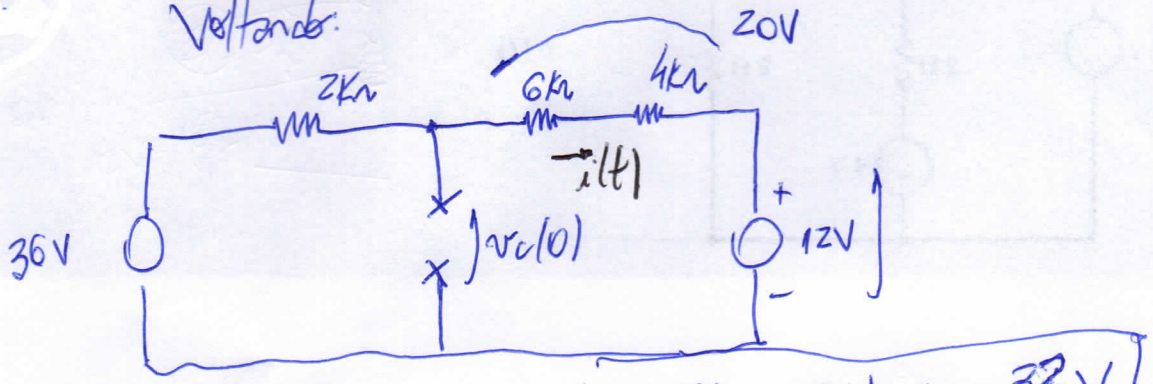


$V_R(0) = \frac{10K}{10K+2K} \cdot 24$

$V_R(0) = \frac{10K}{12K} \cdot 24^2$

$\boxed{V_R(0) = 20V}$

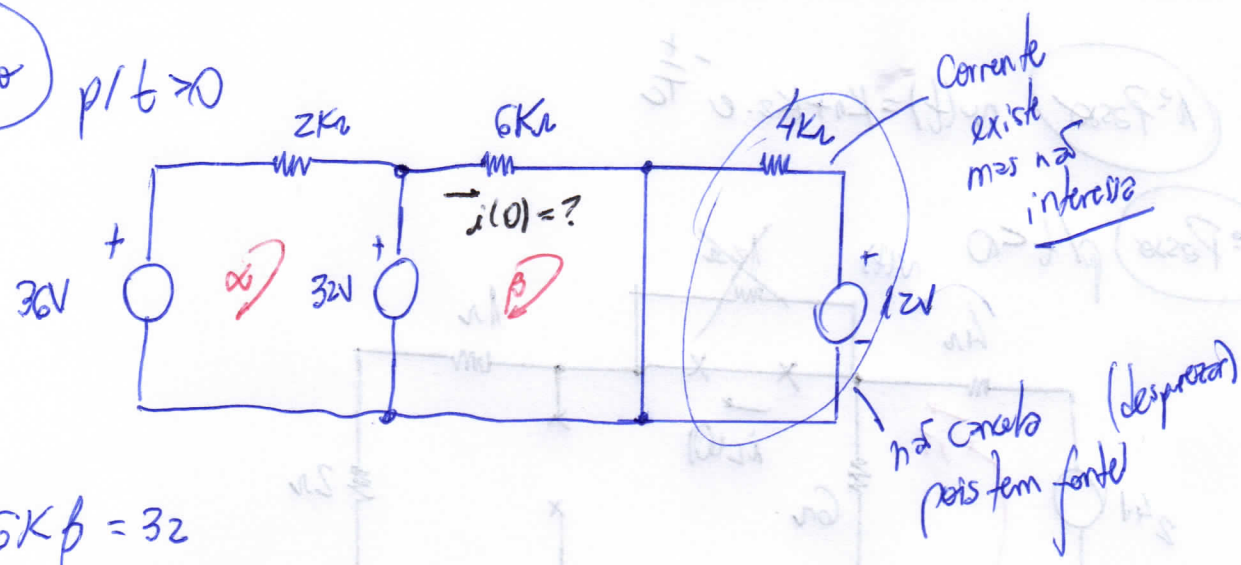
Voltando:



$\boxed{V_c(0) = 20 + 12 = 32V}$

3º Passo

$p/\ t > 0$



$$\begin{cases} 6K\beta = 32 \end{cases}$$

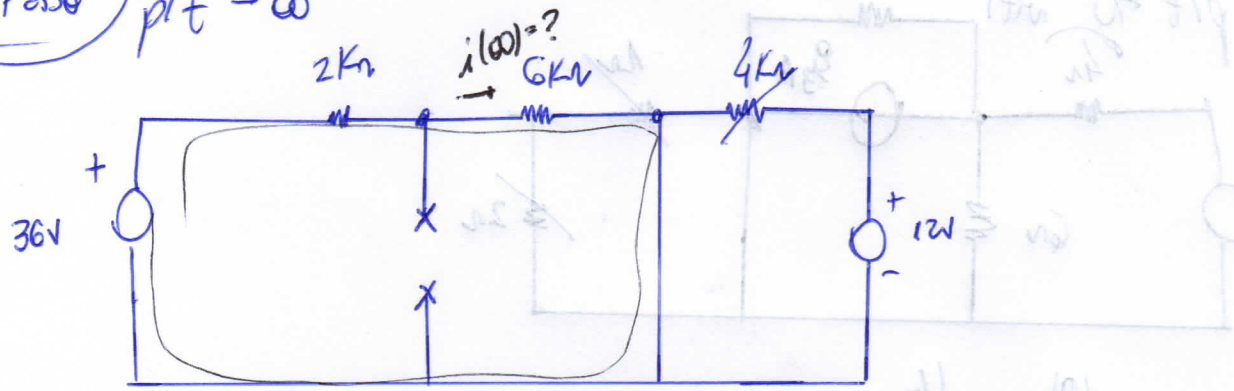
$$\beta = \frac{32}{8\times10^3} = \frac{16}{3}\ mA$$

$$\boxed{i(0) = \frac{16}{3}\ mA}$$

$$i(0) = 5{,}33\ mA$$

4º Passo

$p/\ t \to \infty$



$$i(\infty) = \frac{36}{8\times10^3} \rightarrow \boxed{i(\infty) = \frac{9}{2}} \quad \boxed{i(\infty) = 4{,}5\ mA}$$

5º Passo

$T_c = ?$

$T_c = R_{th} \cdot C$

$R_{th} = 2K // 6K = \frac{2\times6}{2+6} = \frac{12}{8} = \frac{3}{2}\ K\Omega$

$T_c = \frac{3}{2}\cdot10^3 \cdot 100\times10^{-6}$

$\boxed{T_c = 0{,}15\ s}$

6º Passo

$i(0) = K_1 + K_2 = \frac{16}{3}\ mA$

$i(\infty) = K_1 = \frac{9}{2}\ mA$

$\therefore K_1 = \frac{9}{2}\ mA$

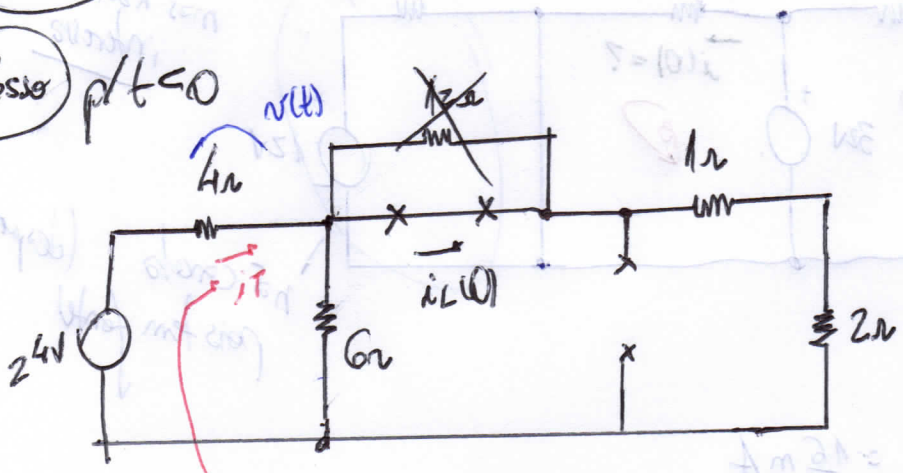
$K_2 = \frac{16}{3} - \frac{9}{2}$

$K_2 = \frac{32-27}{6} = \frac{5}{6}\ mA$

$$\boxed{i(t) = \frac{9}{2} + \frac{5}{6}\cdot e^{-\frac{t}{0{,}15}}\ [mA]}$$

(4) 1° Passo $v(t) = K_1 + K_2 \cdot e^{-\frac{t}{\tau_C}}$

2° Passo $p/\ t<0$



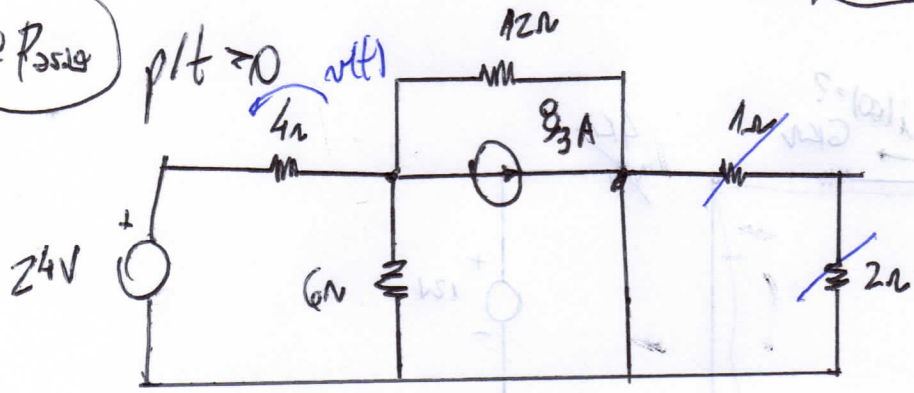
$i_T = \frac{24}{6} = 4A$

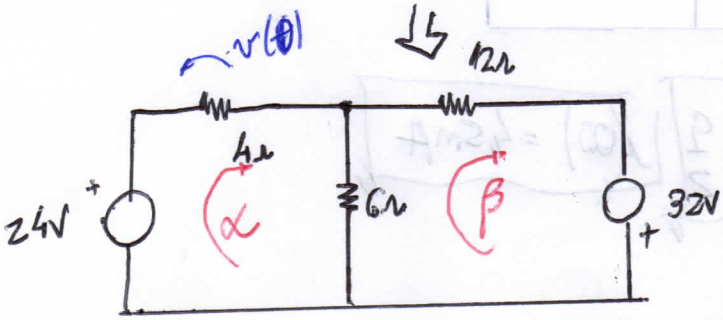
$i_L(0) = \frac{6}{6+3} \cdot 4$

$i_L(0) = \frac{2}{3} \cdot 4$

$\boxed{i_L(0) = \frac{8}{3} A}$

3° Passo $p/\ t>0$





$10\alpha - 6\beta = 24 \quad \times 3$

$-6\alpha + 18\beta = 32$

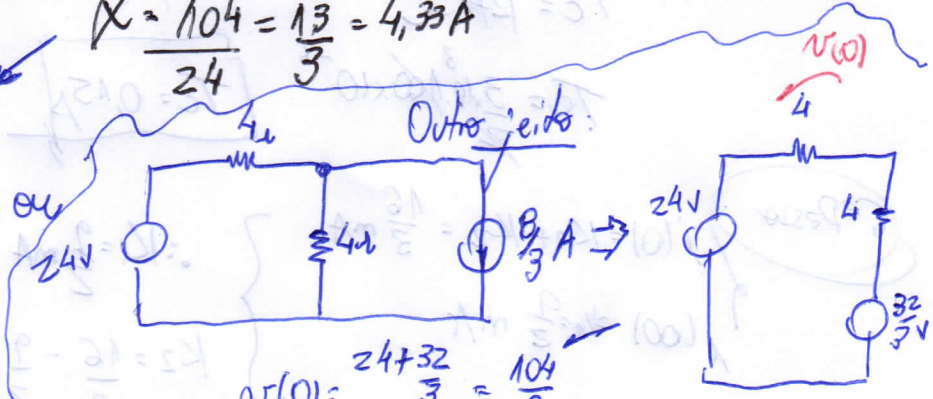
$24\alpha = 104$

$\alpha = \frac{104}{24} = \frac{13}{3} = 4{,}33A$

$v(t) = 4 \cdot \frac{13}{3} = \frac{52}{3} V$

$\boxed{v(0) = \frac{52}{3} V}$

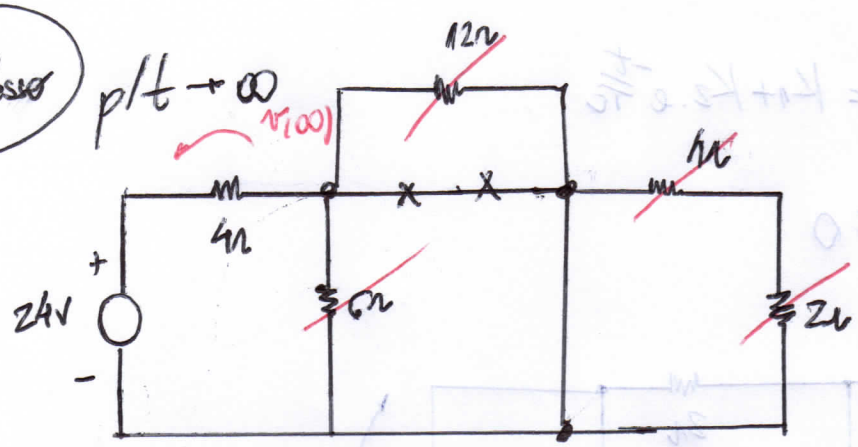
Outro jeito:



$v(0) = \frac{24 + \frac{32}{3}}{2} = \frac{\frac{104}{3}}{2}$

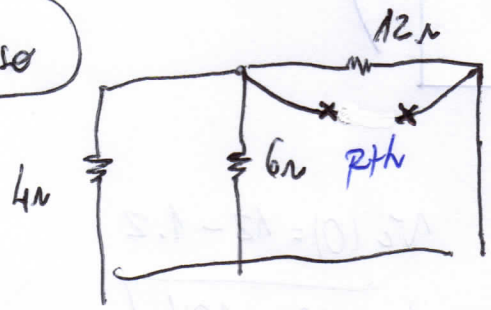
$v(0) = \frac{52}{3} (V)$

4º Passo $p/\ t \to \infty$



$v(\infty) = 24V$

5º Passo



$R_{th} = 12 // 6 // 4$

$R_{th} = \left(\frac{12 \cdot 6}{12+6}\right) // 4$

$R_{th} = 4 // 4$ $\quad \boxed{R_{th} = 2\Omega}$

$\tau = \frac{L}{R_{th}} = \frac{4}{2}$ $\quad \tau = 2s$

6º Passo

$v(0) = K_1 + K_2 = \frac{52}{3}$

$v(\infty) = 24 = K_1$

$\therefore K_1 = 24$

$K_2 = \frac{52}{3} - 24$

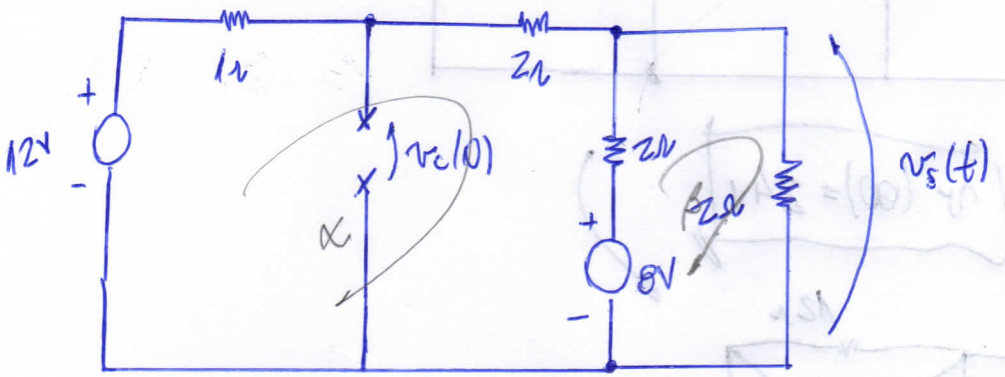
$K_2 = \frac{52 - 72}{3} = -\frac{20}{3}$

$$\therefore \boxed{v(t) = 24 - \frac{20}{3} e^{-\frac{t}{2}} \ [V]}$$

(5) **1º Passo** $v_c(t) = K_1 + K_2 \cdot e^{\frac{-t}{\tau_c}}$

2º Passo

$p/\ t<0$



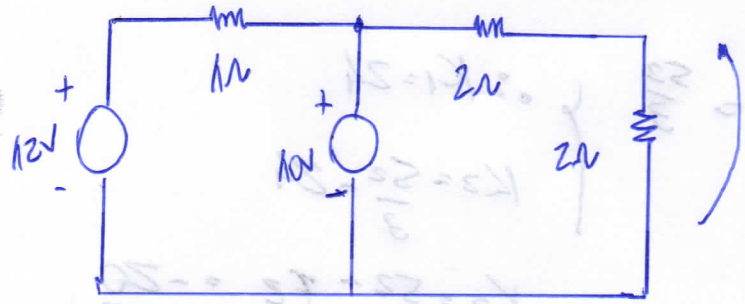
$$\begin{cases} 5\alpha - 2\beta = 12 - 8 \cdot (2) \\ -2\alpha + 4\beta = 8 \end{cases}$$

$8\alpha = 16 \quad \alpha = \frac{16}{8} \quad \boxed{\alpha = 2A}$

$v_c(0) = 12 - 1.2$

$\boxed{v_c(0) = 10V}$

3º Passo $p/\ t>0$

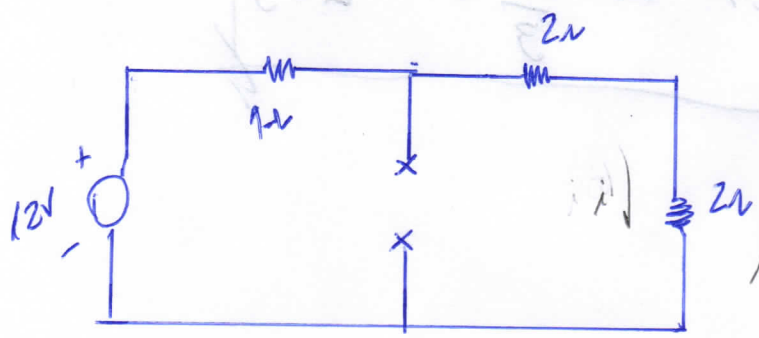


$v_s(0) = ?$

$v_s(0) = \frac{2}{2+2} \cdot 10$

$\boxed{v(0) = 5V}$

4º Passo $p/(t \to \infty)$



$v_s(\infty) = ?$

$i = \frac{12}{5}\ A$

Logo: $v_s(\infty) = 2 \cdot \frac{12}{5}$

$\boxed{v_s(\infty) = \frac{24}{5}\ [V]}$

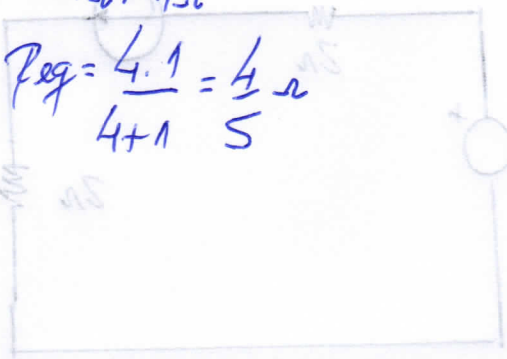
5° Passo $\tau_C = ?$

$\tau_C = R_{eq} \cdot C$ $\quad R_{eq} = 4\Omega \,//\, 1\Omega$

$R_{eq} = \frac{4 \cdot 1}{4+1} = \frac{4}{5}\Omega$

$\tau_C = \frac{4}{5} \cdot 2$

$\tau_C = \frac{8}{5}\,s$



6° Passo

$\therefore v_s(0) = K_1 + K_2 = 5$

$v_s(\infty) = K_1 = \frac{24}{5}$ $\quad \therefore K_1 = \frac{24}{5}$

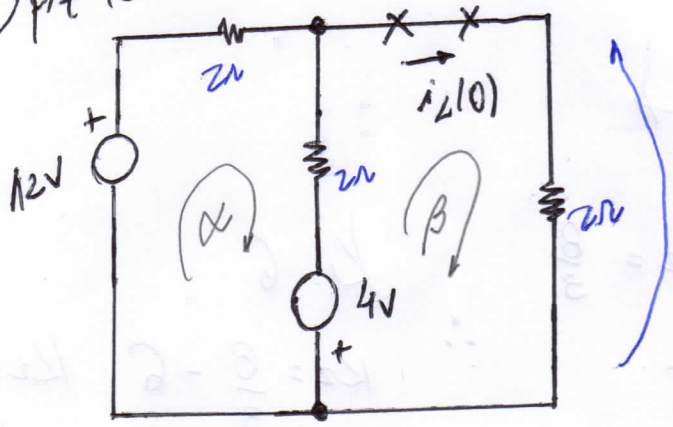
$K_2 = 5 - \frac{24}{5}$

$K_2 = \frac{25-24}{5}$ $\quad K_2 = \frac{1}{5}$

Logo: $v_s(t) = \frac{24}{5} + \frac{1}{5} \cdot e^{-\frac{5}{8}t}$ [V]

(6) 1° Passo $v_s(t) = K_1 + K_2 \cdot e^{-\frac{t}{\tau_C}}$

2° Passo plt 90

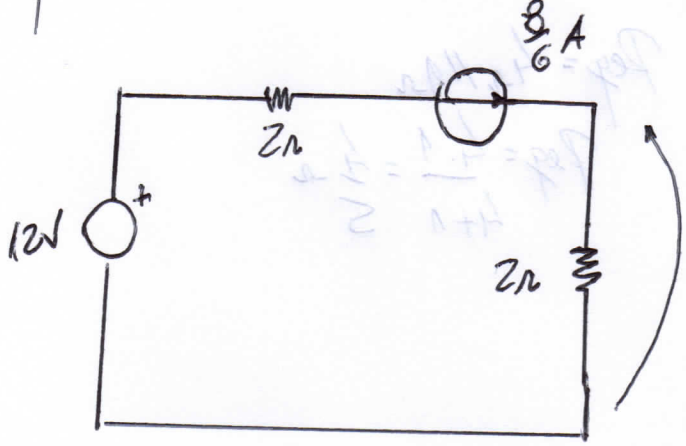


$$+\begin{cases} 4\alpha - 2\beta = 12 + 4 \\ -2\alpha + 4\beta = -4 \end{cases} \cdot (2)$$

$6\beta = 8$

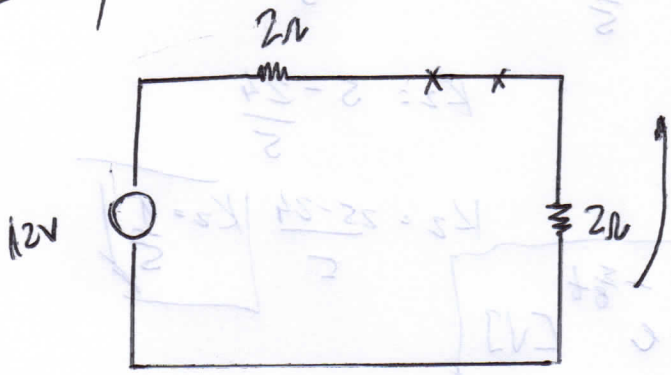
$\beta = \frac{8}{6}$ $\quad i_L(0) = \frac{8}{6}\,A$

3° passo p/ $t > 0$



$$v_s(0) = \frac{8}{6} \cdot 2 = \frac{16}{6} = \frac{8}{3}\ [V]$$

4° passo p/ $t \to \infty$



$$v_s(\infty) = 6\ V$$

$$v_s(\infty) = \frac{2}{2+2} \cdot 12$$

5° passo $\tau_c = \frac{L}{R_{eq}}$ $\quad R_{eq} = R_{th} = \frac{4\Omega}{(2+2)}$

$$\tau_c = \frac{2}{4} = \frac{1}{2}\ s$$

6° passo

$$\begin{cases} v(0) = K_1 + K_2 = \frac{8}{3} \\ v(\infty) = K_1 = 6 \end{cases}$$

$$\therefore \quad K_1 = 6$$

$$K_2 = \frac{8}{3} - 6 \qquad K_2 = \frac{8-18}{3}$$

$$K_2 = -\frac{10}{3}$$

$$v_s(t) = 6 - \frac{10}{3} e^{-2t}\ [V]$$