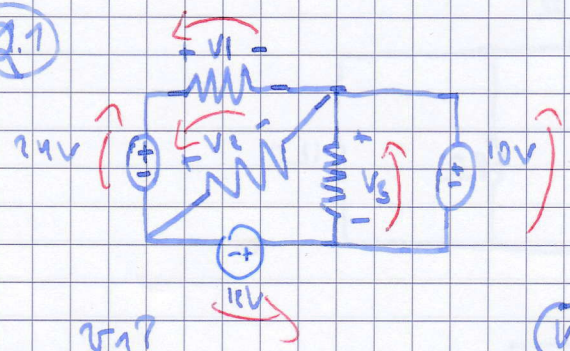
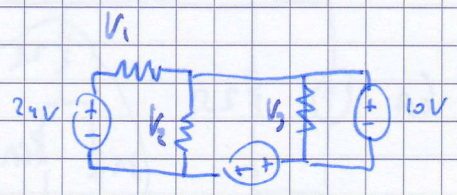
Lingo 1140

TP2

①





v_1?

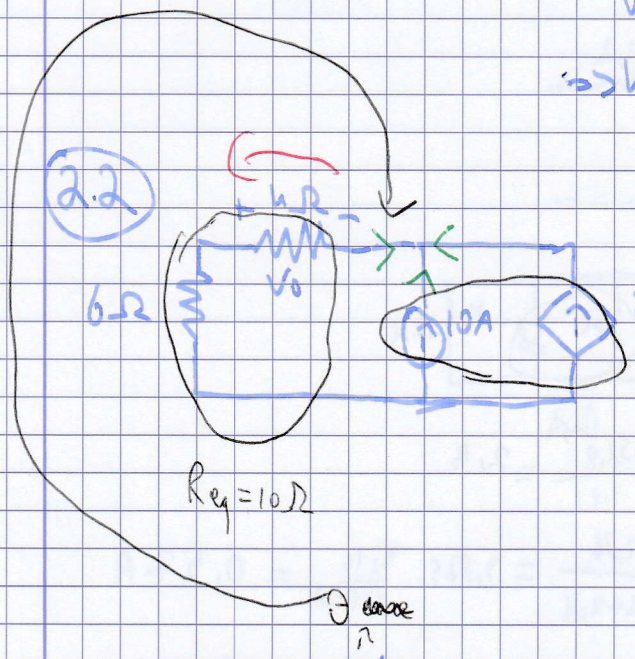
$V_1 = 24 + V_2$

$V_3 = 10_V$

$V_2 + 12 + 10 = 0$

$V_2 = -22$

$\Rightarrow V_1 = 24 - 22 = 2V$



$2V_0 = \frac{-80}{3} A$

$\Rightarrow 10 + \frac{-80}{3} \Rightarrow \frac{10}{3} A$

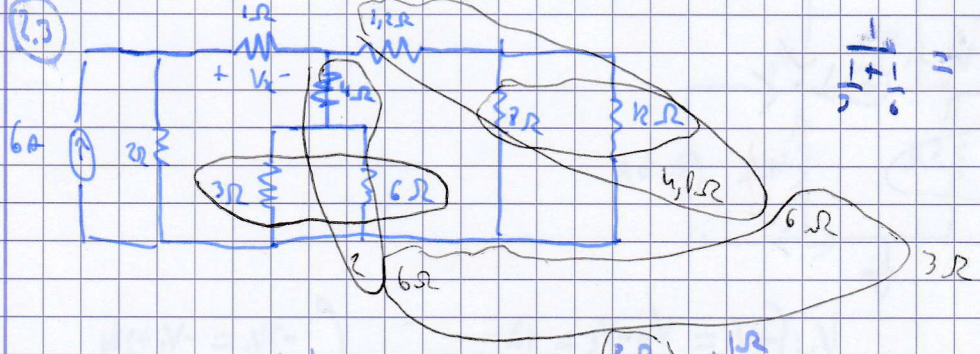
$\frac{V_0}{4} + 10 + 2V_0 =$

$\frac{8V_0}{4} = -10$

$V_0 = \frac{-40}{3} V$

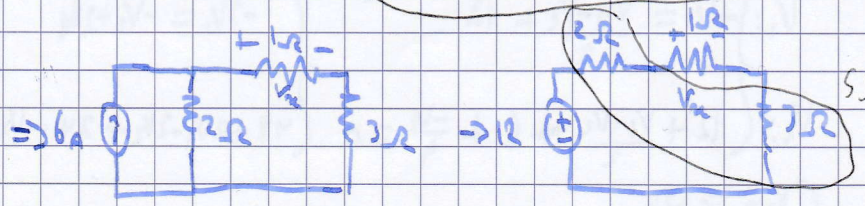
a) $V = R_{eq} \cdot I = 10 \cdot \frac{-40}{3} = -41,11 V$

$\Rightarrow p = v \cdot i = -41,11 \cdot \frac{-80}{3} \cdot \frac{-100}{3} = 38,76 W$

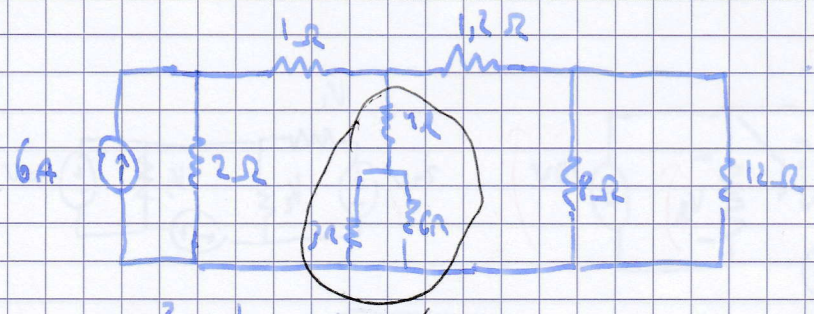


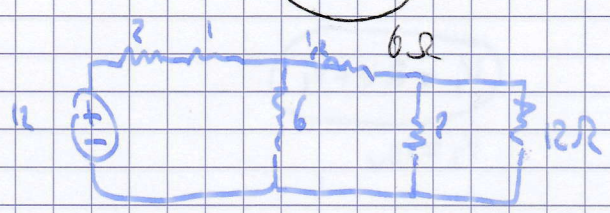
$\frac{1}{\frac{1}{3} + \frac{1}{6}} = \frac{18}{3} = 2$

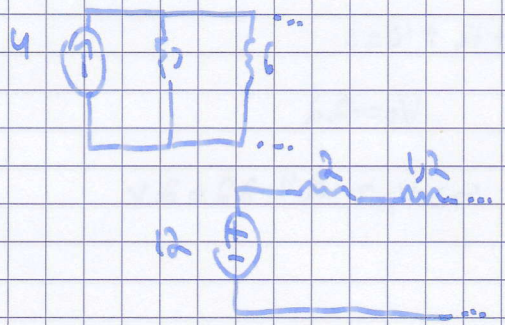
$V = RI$

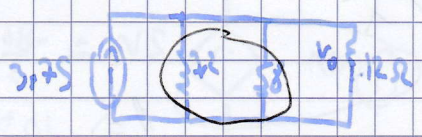


$V_x = 12 \cdot \frac{1}{6} = 2V$









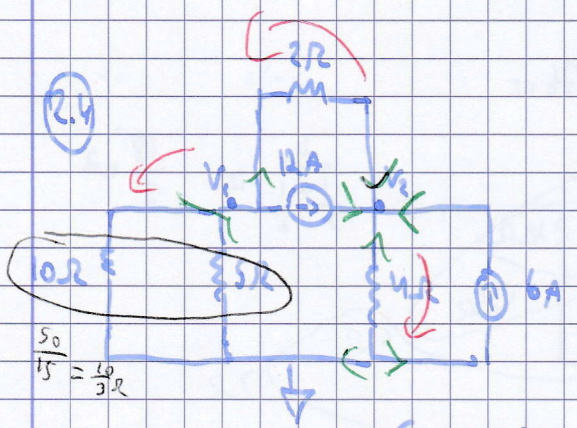
$$\frac{32.8}{12.8} = 2,16$$

$$I_{V_0} = i \cdot \frac{2,16}{12+2,16} = 3,75 \cdot \frac{2,16}{12+2,16} = 0,57\,A$$

$$\Rightarrow V = RI = 6,84\,V$$

$$\Rightarrow P = VI = 3,36\,W$$

2.4



$$V_1: \left\{ -V_1 = \frac{V_1 - V_2}{2} + 12 \right. \qquad \left\{ -3V_1 = -V_2 + 24 \right.$$

$$V_2: \left\{ 12 + \frac{V_1 - V_2}{2} + 6 + \frac{-V_2}{4} = 0 \right. \qquad \left\{ 48 + 2V_1 - 2V_2 + 24 - V_2 = 0 \right.$$

$$\begin{cases} V_2 = 3V_1 + 24 \\ 72 + 2V_1 = 3V_2 \end{cases} \qquad \begin{cases} V_2 = 3V_1 + 24 \\ V_2 = 24 + \frac{2}{3}V_1 \end{cases}$$

$$24 + 3V_1 = 24 + \frac{2}{3}V_1$$

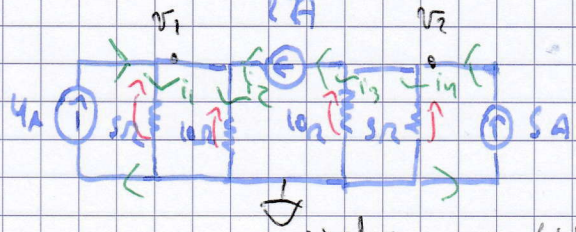
$$V_1 = 0$$

$$\Rightarrow V_2 = 24$$

Luigi1140

TP2

2.5



↳ plan mesh (+facile)

$V = RI$

$I = \frac{V}{R}$

v_1: $\quad 4 + 2 = \frac{v_1}{5} + \frac{v_1}{10}$

$60 = 3v_1$

$v_1 = 20v$

$\rightarrow i_1 = \frac{20}{5} = 4A$

$i_2 = \frac{20}{10} = 2A$

v_2: $\quad 5 = 2 + \frac{v_2}{10} + \frac{v_2}{5}$

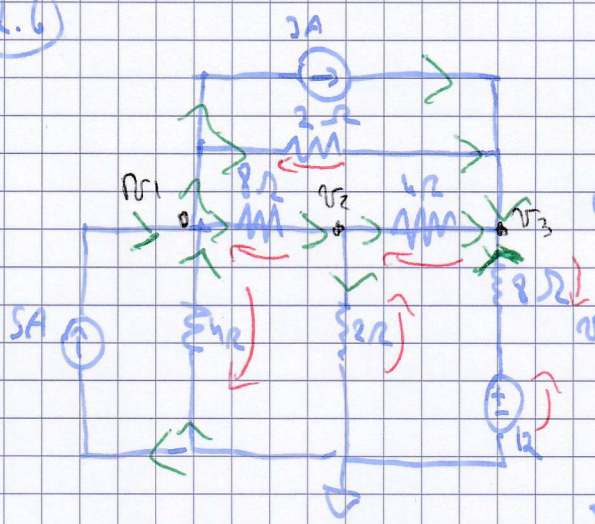
$3 = \frac{3v_2}{10}$

$v_2 = 10$

$\rightarrow i_3 = \frac{10}{10} = 1A$

$i_4 = \frac{10}{5} = 2A$

2.6



v_1: $\quad 5 = \frac{+v_1}{4} + \frac{v_1 - v_2}{8} + 3 + \frac{v_1 - v_3}{2}$

v_2: $\quad \frac{v_1 - v_2}{8} = \frac{v_2}{2} + \frac{v_2 - v_3}{4}$ ✓

v_3: $\quad \frac{v_2 - v_3}{4} + 3 + \frac{v_1 - v_3}{2} + \frac{12 - v_3}{8} = 0$ ✓

$40 = +2v_1 + v_1 - v_2 + 24 + 4v_1 - 4v_3$

$v_1 - v_2 = 4v_2 + 2v_2 - 2v_3$

$2v_2 - 2v_3 + 24 + 4v_1 - 4v_3 + 12 - v_3 = 0$

$+6 - 7v_1 + v_2 + 4v_3 = 0$ ✓

$v_1 - 7v_2 + 2v_3 = 0$

$36 + 4v_1 + 2v_2 - 6v_3 = 0$

$-7v_1 + v_2 + 4v_3 = -16$

$v_1 - 7v_2 + 2v_3 = 0$

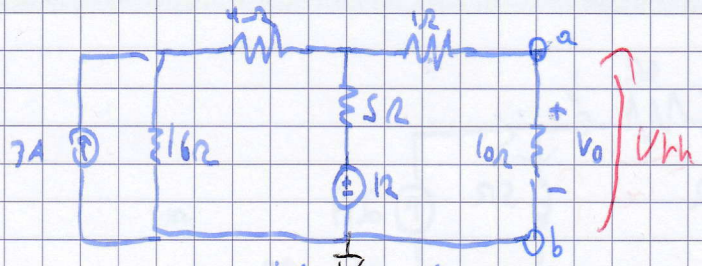
$4v_1 + 2v_2 - 6v_3 = -36$

$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} v_1 \\ v_2 \\ v_3 \end{pmatrix} = \begin{pmatrix} 10 \\ \frac{74}{15} \\ \frac{184}{15} \end{pmatrix}$

Info1140

TP3

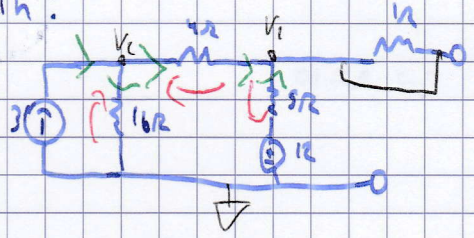
① 3.1



R_{eq} :

$1 + (5 // (16+4)) = 1+4 = 5\,\Omega$

V_{Th} :

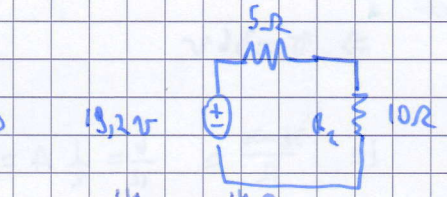


→ boucle de 1k avec que courant

V_1 : $\frac{V_2 - V_1}{4} + \frac{12 - V_1}{5} = 0$ ⟺ $5V_2 - 5V_1 + 48 - 4V_1 = 0$

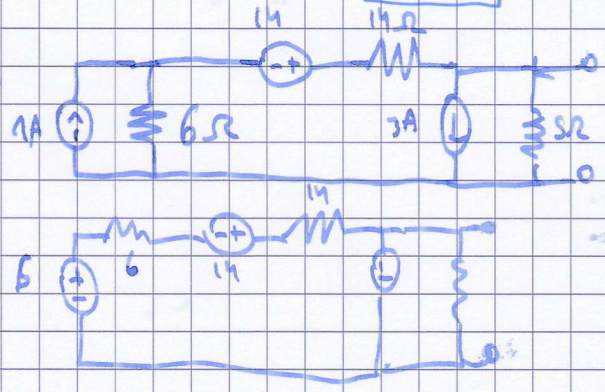
V_2 : $3 = \frac{V_2}{16} + \frac{V_2 - V_1}{4}$ ⟺ $48 = V_2 + 4V_2 - 4V_1$

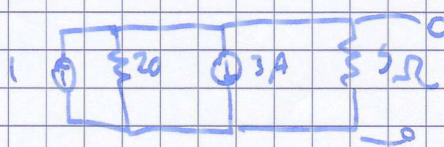
$\begin{cases} -5V_1 + 5V_2 = -48 \\ -4V_1 + 5V_2 = 48 \end{cases}$ $V_1 = 19{,}2 = V_{Th}$ $V_2 = 24{,}96$



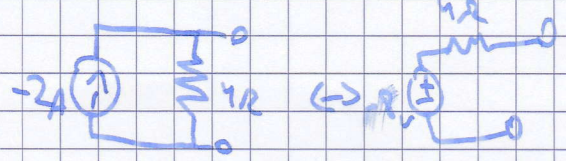
$\Rightarrow$ $V_{R_2} = V_0 = 19{,}2 \cdot \frac{10}{5+10} = 19{,}2 \cdot \frac{2}{3} = 12{,}8$

3.2

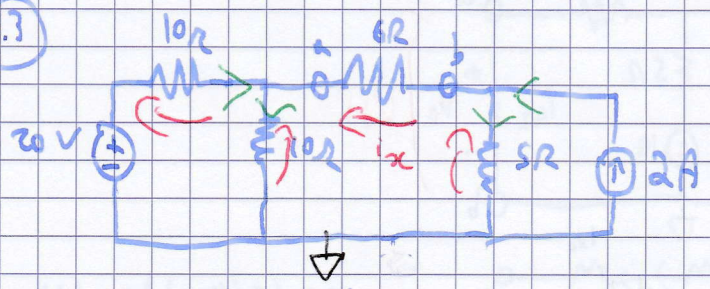




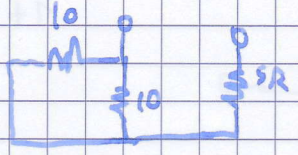
$\frac{20 \cdot 5}{25} = 4$



3.3



Ers:



$5+(10//10)=10\ \Omega$

a: $\frac{20-a}{10}=\frac{a}{10}$ $\Rightarrow a=10$

10	2	12	2
5	5	6	2
1		3	3
		1	

b: $2=\frac{b}{5}$

$b=10$

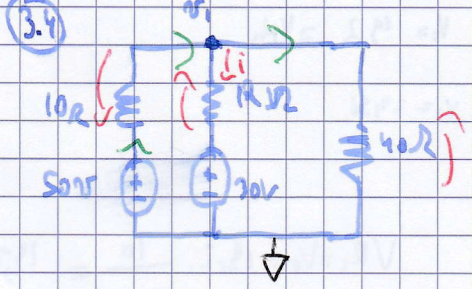
40	8
20	2
10	2
5	5
1	

$a-b=0\,V$

$i_k=\frac{V}{R}=0$

5.2.3.2.2.5

3.4



v_1: $\frac{50-v_1}{10}=\frac{v_1-30}{12}+\frac{v_1}{40}$

$\Rightarrow v_1=36\,V$

$i=\frac{36-30}{12}=\frac{6}{12}=\frac{1}{2}A=500\,mA$

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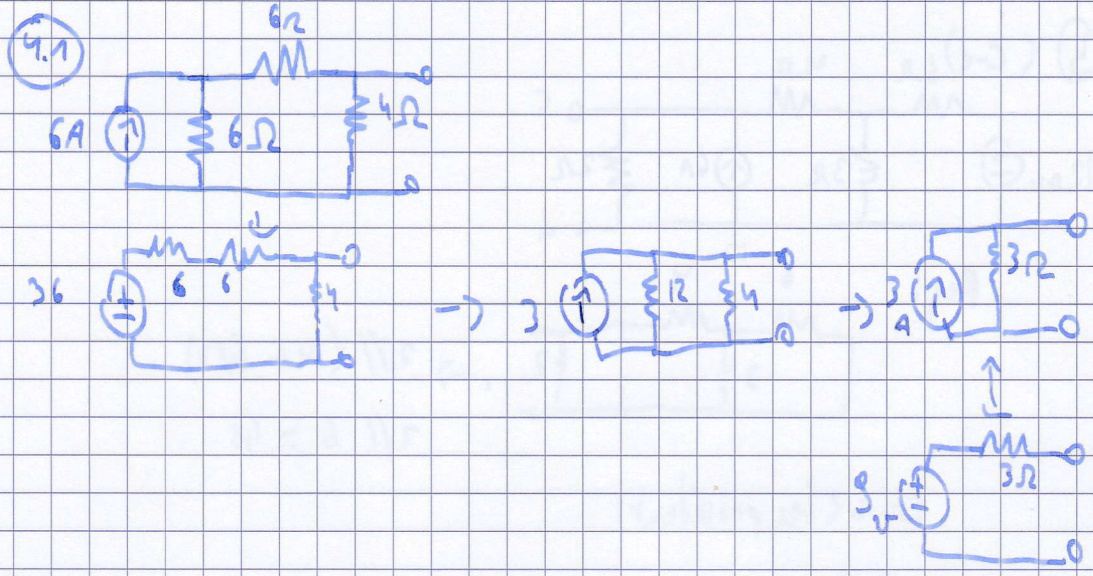
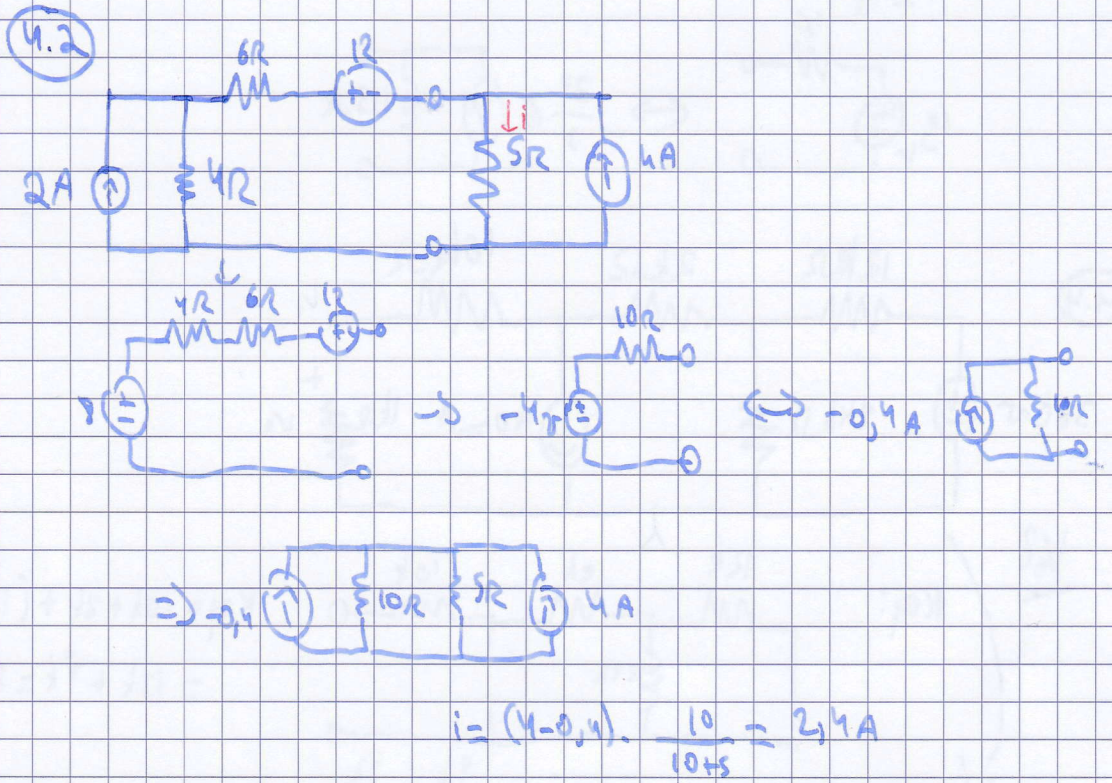
ТРЧ

①

4.1

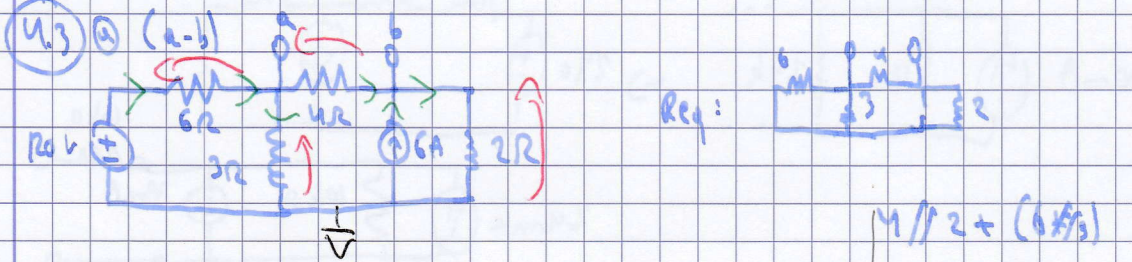


4.2



$$i = (4 - 0{,}4) \cdot \frac{10}{10+5} = 2{,}4\,A$$

4.3 ⓐ (a-b)



$4 // 2 + (6 // 3)$

$4 // 4 = 2\ \Omega$

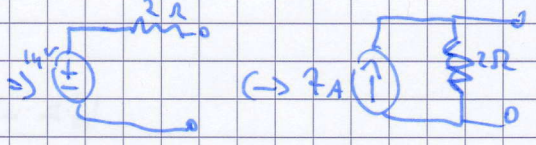
a: $\begin{cases} \frac{120-a}{6} = \frac{a}{3} + \frac{a-b}{4} \\ \frac{a-b}{4} + 6 = \frac{b}{2} \end{cases}$ $\begin{cases} 240 - 2a = 4a + 3a - 3b \\ a - b + 24 = 2b \end{cases}$

b:

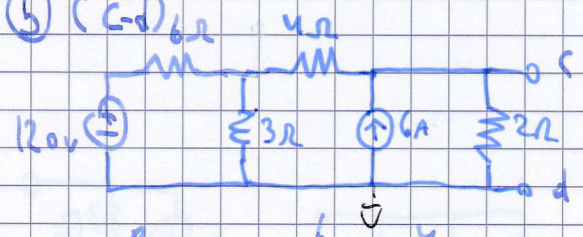
$$\begin{cases} \cdot\ 9a - 3b = 240 \\ \cdot\ a - 3b = -24 \end{cases}$$

$$\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} a \\ b \end{pmatrix} = \begin{pmatrix} 33 \\ 15 \end{pmatrix}$$

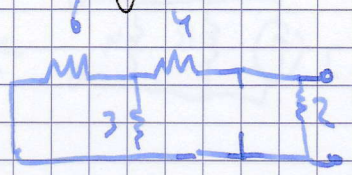
$a - b = 14$



(5) (c-d)



Req :

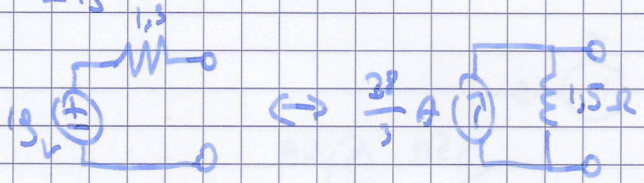


→ 2 // (4 + 6//3)

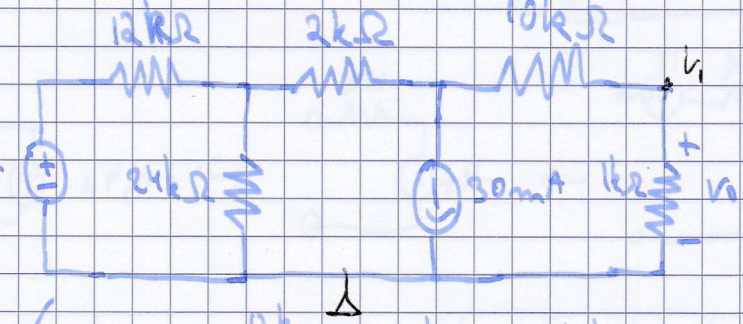
2 // 6 = 1,5

c = b (de précédent)

= 18

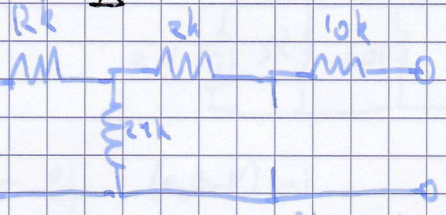


(4.4)



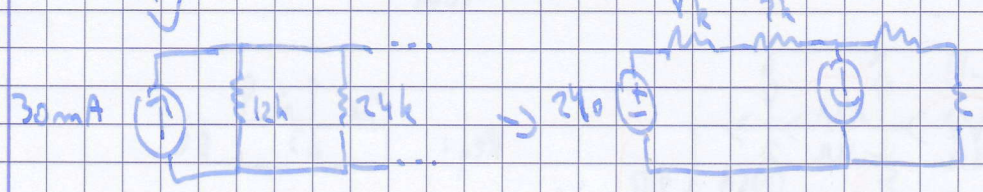
V_o ?

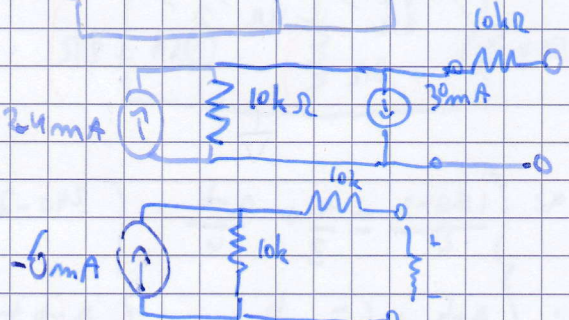
Req :

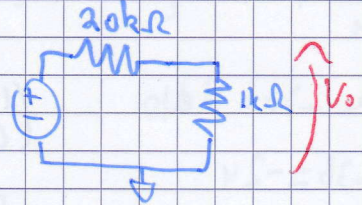


Req = 10k + 2k + (12k // 21k)

= 12k + 7k = 20k







$V_o = -60 \cdot \frac{1}{20+1} = \frac{-60}{21} = -2,86V$

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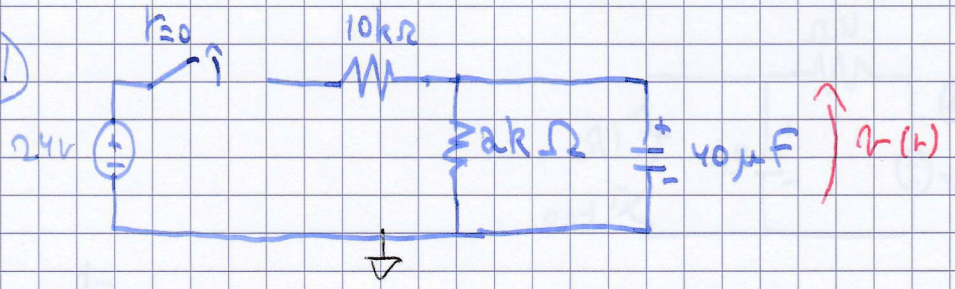
TPS

① S.1



$v(t=0) = 24 \cdot \frac{2}{10+2} = 4v$

↳ switch fermé

$v(t=\infty) = 0v$

↳ switch ouvert

$v(t) = v(\infty) + [v(0) - v(\infty)]e^{\frac{-t}{\tau}}$

$= 24e^{\frac{-t}{\tau}}$

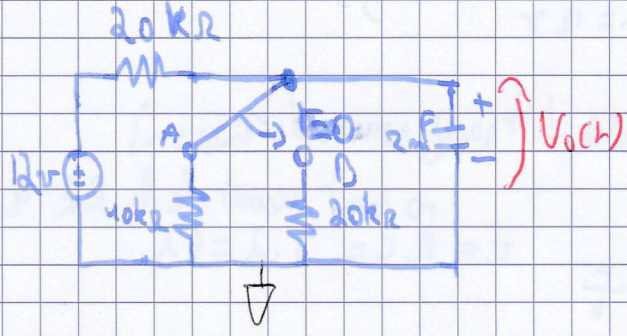
$\tau = R.C$

$R = 2k\Omega$ (on compte quand le switch est ouvert)

$\Rightarrow v(t) = 24\, e^{\frac{-t}{2.10^3 . 40.10^{-6}}}$

$= 24\, e^{\frac{-t.10^3}{80}}$

S.2



$v_0(t=0) = 12 \cdot \frac{40}{20+40} = 12 \cdot \frac{2}{3} = 8v$

↳ Switch sur A

$v_0(t=\infty) = 12 \cdot \frac{20}{20+20} = 6v$

↳ Switch sur B

$v_0(t) = 6 + (8-6)e^{\frac{-t}{\tau}}$

$= 6 + 2e^{\frac{-t}{RC}}$

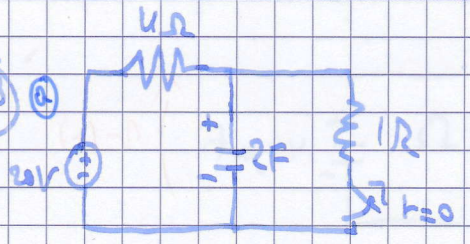
$R_{eq} = 10k\Omega \ (20 // 20)$

$C = 2m$

$\Rightarrow R.C = 20$

$\Rightarrow v_0(t) = 6 + 2e^{\frac{-t}{20}}$

S.3 ⓐ



$v(t=0) = 8\Omega \cdot \frac{1}{4+1} = 4V$ ⇒ $v(t) = 20 - 16e^{\frac{-t}{\tau}}$

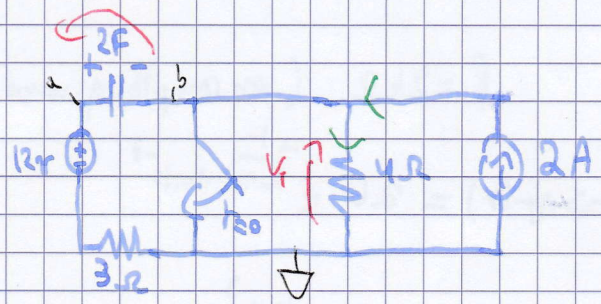
↳ Switch fermé

$\tau = 2 \cdot R = 2 \cdot 4 = 8\,s$

$v(t=\infty) = 20V$

↳ Switch ouvert ⇒ $v(t) = 20 - 16e^{\frac{-t}{8}}$

ⓑ



$v(t=0) = a - b$ ⇒ $V_1 = 4 \cdot 2 = 8V = b$ } $a - b = 4V$

↳ Switch ouvert $a = 12V$

$v(t=\infty) = 12V$ (boîte détruit source de tension)

⇒ court circuit de la R2 4Ω

$v(t) = 12 - 8e^{\frac{-t}{\tau}}$ $\tau = R \cdot C = 3 \cdot 2 = 6\,s$

⇒ $v(t) = 12 - 8e^{\frac{-t}{6}}$

$\left(i(t) = C \cdot v(t)' = 2 \cdot \left(+8 \cdot \left(\frac{+1}{6} \cdot e^{-\frac{t}{6}} \right) \right) = \frac{8}{3} e^{-\frac{t}{6}} \right)$

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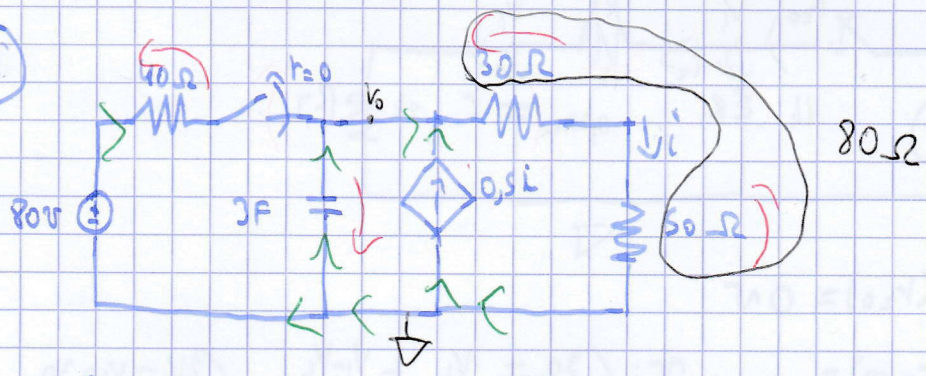
TPS
(2)

(5.4)

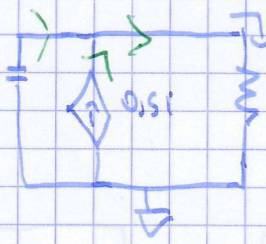


$v(0) = 64v$

↳ Switch fermé

$v(0)$: $\begin{cases} i = \frac{v_0}{80} \\ 0{,}5i + \frac{80 - v_0}{40} = i \end{cases}$ $\begin{cases} i = 0{,}8A \\ v_0 = 64v \end{cases}$

$v(\infty) =$



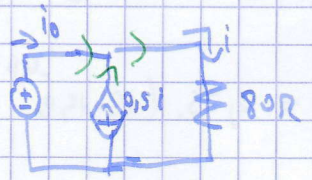
$-0{,}5i + i = 0{,}5i$

↳ Capa mais $\Rightarrow I_{capa} = 0 \rightsquigarrow i = 0$

$\Rightarrow V = R \cdot I \Rightarrow V = 0$

$\Rightarrow v(\infty) = 0$

$v(t) = 64e^{\frac{-t}{\tau}}$ $\quad \tau = R \cdot C$ $\quad$ ⚠ Source commandée $R_{eq} = \frac{V}{i}$



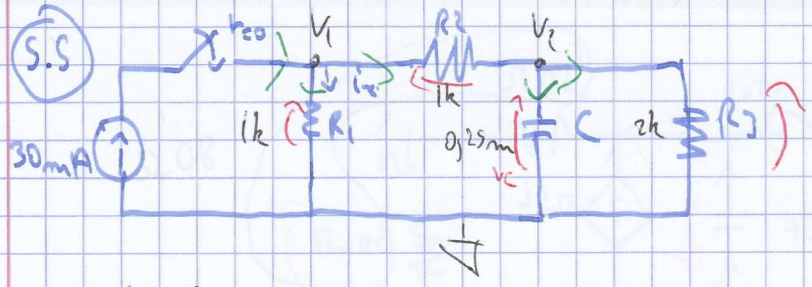
Je connais v $\Rightarrow$ me trace

$\begin{cases} i_0 = \frac{1}{80} \\ i_0 + 0{,}5i = i \end{cases}$ $\begin{cases} i_0 = \frac{1}{80} \\ i = \frac{1}{160} \end{cases}$

$\Rightarrow R_{eq} = \frac{1}{\frac{1}{160}} = 160\Omega$

$\Rightarrow v(t) = 64e^{\frac{-t}{480}}$

$i(t) = C \cdot 64 \cdot \left(e^{\frac{-t}{480}}\right)' = -\frac{64 \cdot 3}{480} e^{\frac{-t}{480}} = -\frac{3}{5} e^{\frac{-t}{480}}$



$v_c(t=0) = 0\,V$

$v_c(t=\infty) =$

$v_1: \begin{cases} 30 = \frac{V_1}{1} + \frac{V_1 - V_2}{1} \end{cases} \quad \begin{cases} 2V_1 - V_2 = 30 \\ 2V_1 - 3V_2 = 0 \end{cases}$

$v_2: \begin{cases} \frac{V_1 - V_2}{1} = \frac{V_2}{2} \end{cases}$

$\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} V_1 \\ V_2 \end{pmatrix} = \begin{pmatrix} 22,5 \\ 15 \end{pmatrix}$

$V_C = V_2 - 0 = 15$

$\Rightarrow v(t=\infty) = 15$

$\tau = R \cdot C \qquad Req = (4+1)//2 = \frac{10}{3}\,\Omega$

$= 1k \cdot 0,25m$

$= 0,25\,s = \frac{1}{4}\,s$

$\Rightarrow v_c(t) = 15 - 15e^{-4t}\,V$

$i_c(t) = 0,25 \cdot (15 - 15e^{-4t})' = \frac{1}{4} \cdot (+15) \cdot (+4) \cdot e^{-4t}$

$= 15e^{-4t}\,mA$

$30 = i_x + \frac{V_1 - V_2}{1}$

$i_x = 30 + V_2 - V_1$

$= 30 + 15 - 15e^{-4t} - V_1$

$= 45 - 15e^{-4t} -$

$= 45 - 15e^{-4t} - 22,5 + 7,5e^{-4t}$

$= 22,5 - 7,5e^{-4t}$

$i_x = 7,5 \cdot (3 - e^{-4t})$

$V_1 = \frac{V_2 + 30}{2}$

$= \frac{15 - 15e^{-4t} + 30}{2}$

$= 22,5 - 7,5e^{-4t}$

$V_2 = v_c(t)$

$v_1: \begin{cases} 30 = V_1 + V_1 - V_2 \end{cases}$

$v_2: \begin{cases} V_1 - V_2 = \frac{V_2}{2} + 15e^{-4t} \end{cases}$

$\begin{cases} V_2 = 2V_1 - 30 \\ V_1 + 2V_1 + 30 = V_1 - 15 + 15e^{-4t} \end{cases}$

$2V_1 = 15e^{-4t} - 30$

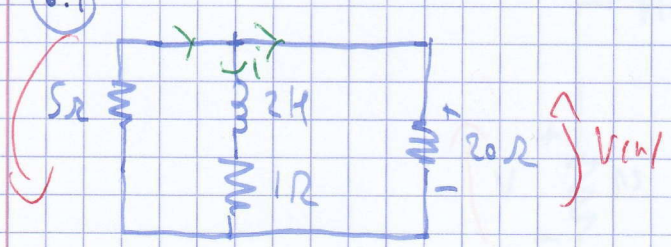
$V_1 = 45 + 7,5e^{-4t}$

Info1140

TP6

(1)

6.1



$i(0) = 10\,A$

$i(\infty) = 0\,A$ (déchargé)

Req : $1 + (5 // 20) = 5\,\Omega$

$\tau = \frac{L}{R_{eq}} = \frac{2}{5}$

$i(t) = 10.e^{-\frac{5t}{2}}$

v(t) ?:

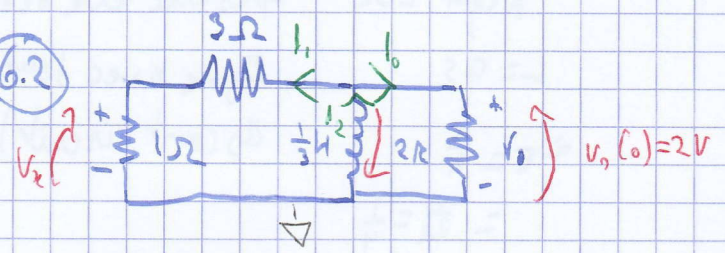
$\frac{-v_t}{5} = i_t + \frac{v_t}{20}$

$-4v_t = 20 i_t + v_t$

$-5v_t = 20 i_t$

$v_t = -\frac{20}{5}.10\,e^{-\frac{5t}{2}} = -40\,e^{-\frac{5t}{2}}$

6.2



$i_2 = i_1 + i_0$

$i_0 = 1\,A$

$i_1 = \frac{v_0}{3\Omega} = \frac{1}{2}$

$\Big\}\ i_2(0) = 1{,}5\,A$

$t = \infty$: $v_0 = 0$, $v_x = 0$ $\Big\}\ i_2 = 0$

$R_{eq} = \frac{4}{3}\,\Omega$

$\tau = \frac{\frac{1}{3}}{\frac{4}{3}} = \frac{1}{4}\,s$

$\Rightarrow i_2(t) = 1{,}5.e^{-4t}\,A$

$v_{ind}(t) = \frac{1}{3}.(i_2(t))' = \frac{1}{3}.\frac{3}{2}.(-4)\,e^{-4t} = -2e^{-4t}$

$v_0 = -v_{ind} = 2e^{-4t}$

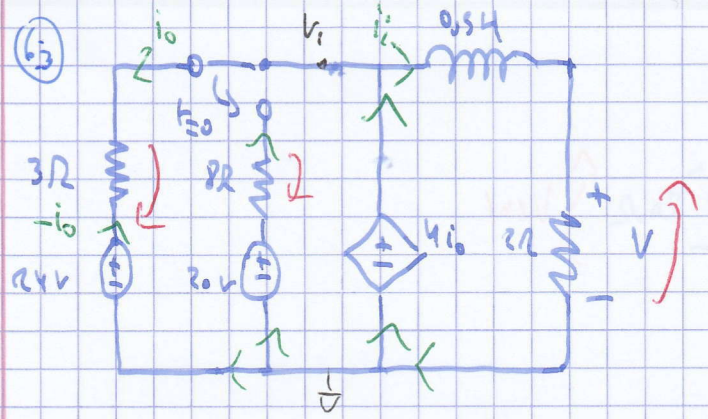
$\rightarrow$ *

* $i_0 = e^{-4t}\,A$

$i_1 = i_2 - i_0 = 1{,}5e^{-4t} - e^{-4t} = 0{,}5e^{-4t}$

$v_x(t) = 0{,}5\,e^{-4t}\,V$

(6.3)



$I_1(t=0)$: v_1 : ① $v_1 = 2 \cdot i_1$

② $v_1 = 4 i_0$ ③ $-i_0 = \frac{24 - v_1}{3}$

③ $v_1 = 4 i_0 = 0$

③ $v_1 - 3 i_0 = 24$

$$\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} v_1 \\ i_0 \end{pmatrix} = \begin{pmatrix} 96 \\ 24 \end{pmatrix}$$

① $\Rightarrow I_1(t=0) = \frac{96}{2} = 48\,A$

$I_1(t=\infty)$: v_1 : ① $v_1 = 2 I_1$ $\quad I_1 = 0$

② $v_1 = 4 i_0$ $\quad v_1 = 0$

$-i_0 = 0$ (circuit ouvert)

$I_1(t=\infty) = 0$

$\Rightarrow I_1(t) = 48 e^{-\frac{t}{\tau}}$

$R_{eq} = 2\,\Omega$ (pas avec celle de 8Ω car hors avec source commandé ↳ court circuité)

$L = 0{,}5$

$\Rightarrow \tau = \frac{L}{R}$

$= \frac{1}{2 \cdot 2} = \frac{1}{4}$

$\Rightarrow I_1(t) = 48 e^{-4t}$

$v(t) = \frac{1}{2} \cdot (-4) \cdot 48 \cdot e^{-4t} = -96 e^{-4t}$

Lista 11 40

TP 6

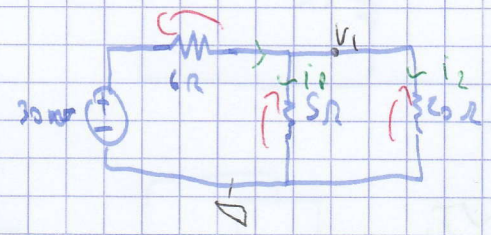
(2)

(6.4) $i_1(t)$ $i_2(t)$?

$i_1 = 5 \cdot \frac{\frac{20}{4}}{\frac{20}{11} + \frac{20}{4}} = \frac{20}{28} =$

$\frac{6.5}{5+6} = \frac{30}{11}$

$t=0^-$:



$\frac{30-V_1}{6} = \frac{V_1}{5} + \frac{V_1}{20}$

$\frac{30-V_1}{6} = \frac{V_1}{4}$

$120 - 4V_1 = 6V_1$

$V_1 = 12V$

$\rightarrow i_1 = \frac{12}{5} = 2,4A$

$i_2 = \frac{12}{20} = 0,6A$

$t=0^+$ $\quad i_1 = 0$, $i_2 = 0$ $\rightarrow$ Curto circuito $\Rightarrow I = \frac{V}{R} = \frac{0}{\infty} = 0$

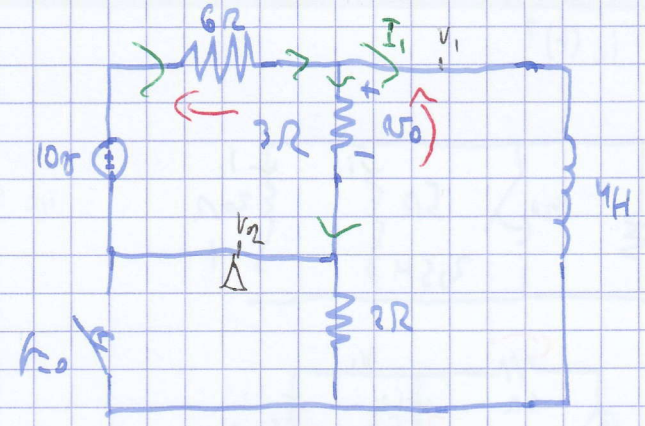
$\Rightarrow i(t) = 2,4 \cdot e^{-\frac{t}{\tau}}$ $\quad \tau = \frac{5}{2.20} = \frac{1}{40}$

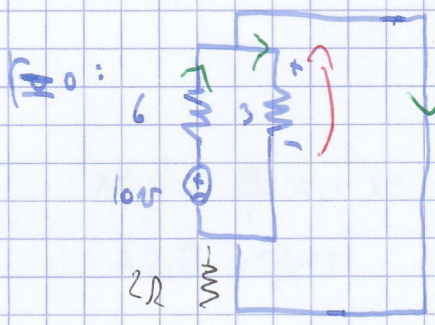
$i_1(t) = 2,4 \cdot e^{-\frac{40t}{5}} = 2,4 \cdot e^{-8t}$ A

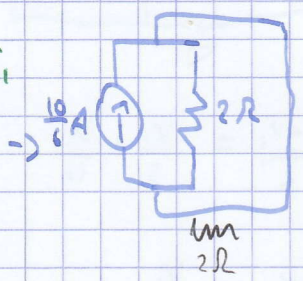
$\rightarrow i_2(t) = 2,4\, e^{-\frac{t}{\tau}}$ $\quad \tau = \frac{4}{5}$

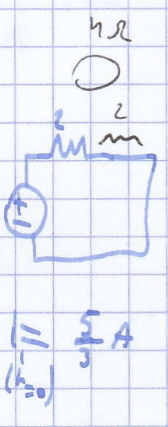
$i_2(t) = 2,4\, e^{-\frac{5t}{4}}$ A

(6.5) v_0?









$\Rightarrow i_1(t=\infty) = \frac{5}{6}$A

$t=\infty$: (x)

$R_{eq} = 2 + (6 \| 3) = 4\,\Omega$

$\Rightarrow i_1(t) = \frac{5}{6} + \frac{5}{6} e^{-\frac{t}{\tau}}$ $\quad \tau = \frac{L}{R} = \frac{4}{4} = 1$

$i_1(t) = \frac{5}{6}(1 + e^{-t})$

v_0: $I_1 = \frac{V_1}{3} + \frac{10 - V_1}{6}$

$6I_1 = 10 + V_1$

$V_1 = 15 + 5e^{-t}$

$\Rightarrow v_0(t) = 15 + 5e^{-t}$ V