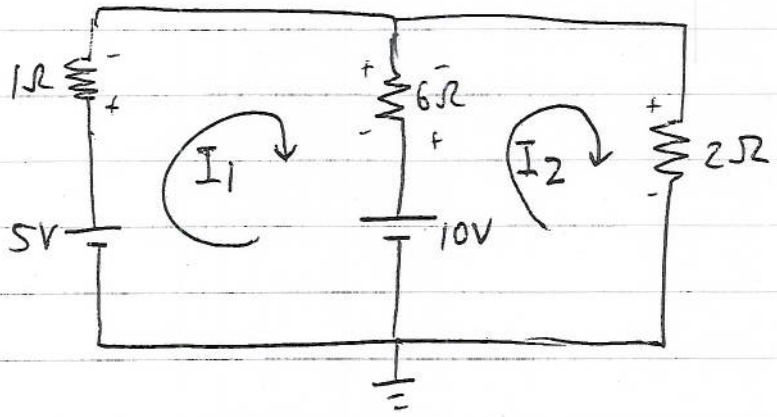
TI 89 +
92 +

TI Voyage 200

EX 8.12



KVL ① : $-5 + I_1 1 + (I_1 - I_2) 6 + 10 = 0$

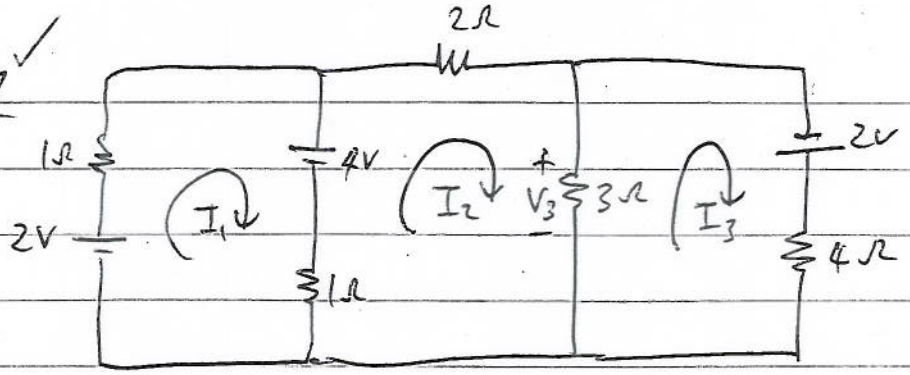
KVL ② : $-10 + (I_2 - I_1) 6 + I_2 2 = 0$

$$\Rightarrow \begin{cases} I_1(7) + I_2(-6) = -5 \\ I_1(-6) + I_2(6+2) = +10 \end{cases}$$

"Simult" $\Rightarrow \begin{cases} I_1 = 1A \\ I_2 = 2A \end{cases}$

ON — Simult — [1] New — Solve = F5.

Ex 8.17 ✓



loop①: $-2 + I_1 1 + 4 + (I_1 - I_2) 1 = 0$

loop②: $(I_2 - I_1) 1 - 4 + I_2 2 + (I_2 - I_3) 3 = 0$

loop③: $(I_3 - I_2) 3 - 2 + I_3 4 = 0$

$$\Rightarrow \begin{cases} I_1(1+1) + I_2(-1) + I_3(0) = -2 \\ I_1(-1) + I_2(1+2+3) + I_3(-3) = 4 \\ I_1(0) + I_2(-3) + I_3(3+4) = 2 \end{cases}$$

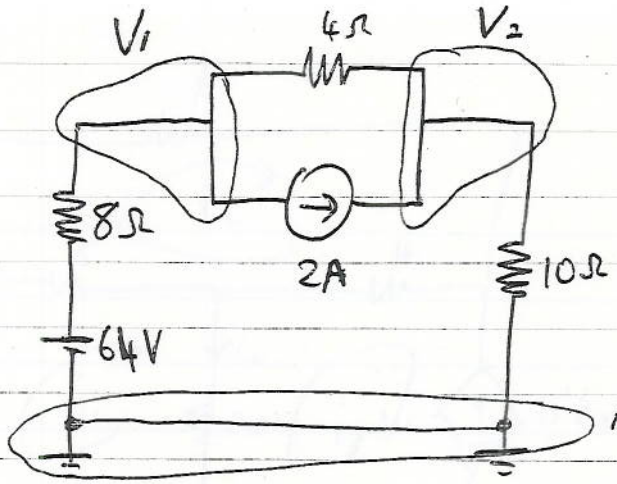
simult ⇒ $I_1 = -.542$

$I_2 = .915$

$I_3 = .678$

Voltage $V_3 = (I_2 - I_3) 3 = .711 V$

EX 8.20

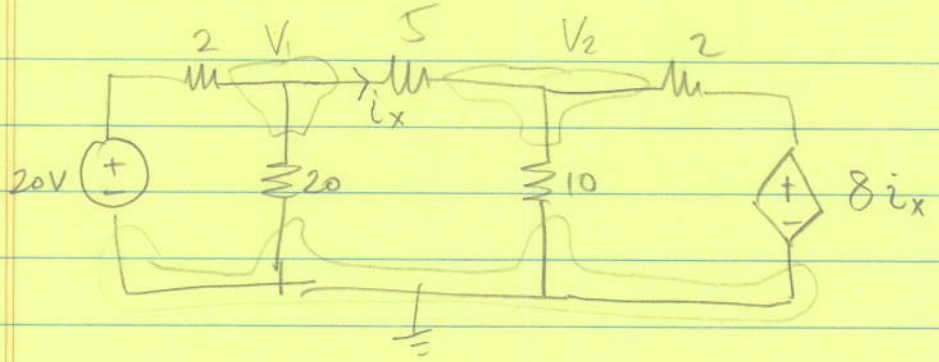


$$\begin{cases} \text{Node ①}: \quad \dfrac{V_1 - 64}{8} + \dfrac{V_1 - V_2}{4} + 2 = 0 \\ \text{Node ②}: \quad \dfrac{V_2 - V_1}{4} + (-2) + \dfrac{V_2}{10} = 0 \end{cases}$$

$$\Rightarrow \begin{cases} V_1\left(\frac{1}{8} + \frac{1}{4}\right) + V_2\left(-\frac{1}{4}\right) = \underbrace{-2 + 8}_{6} \\ V_1\left(-\frac{1}{4}\right) + V_2\left(\frac{1}{4} + \frac{1}{10}\right) = 2 \end{cases}$$

Simul $\Rightarrow$ $\begin{cases} V_1 = 37.818\,V \\ V_2 = 32.727\,V \end{cases}$

Node voltage



$$\frac{V_1-20}{2}+\frac{V_1-0}{20}+\frac{V_1-V_2}{5}=0 \quad \text{---(1)}$$

$$\frac{V_2-V_1}{5}+\frac{V_2-0}{10}+\frac{V_2-8i_x}{2}=0 \quad \text{---(2)}$$

But $i_x=\frac{V_1-V_2}{5}$ (Ohm's law)

$$\frac{V_2-V_1}{5}+\frac{V_2}{10}+\frac{V_2-8\left(\frac{V_1-V_2}{5}\right)}{2}=0 \quad \text{---(2')}$$

Std

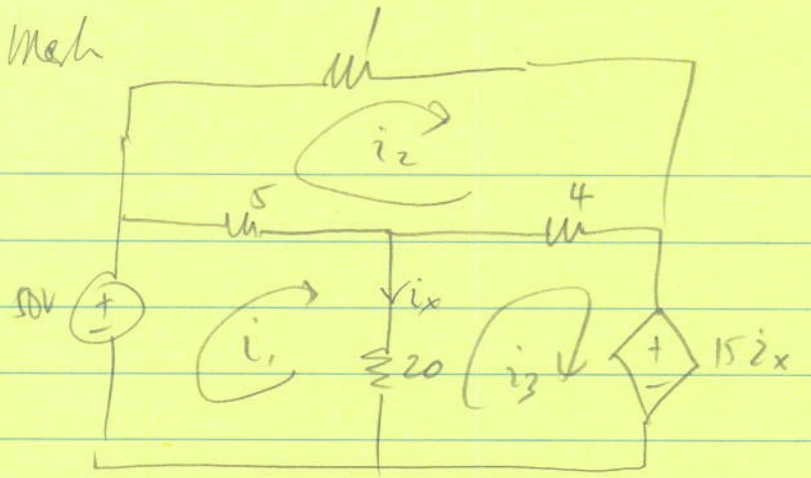
$$\begin{cases} V_1\left(\frac{1}{2}+\frac{1}{20}+\frac{1}{5}\right)+V_2\left(-\frac{1}{5}\right)=+\frac{20}{2} \\ V_1\left(-\frac{1}{5}-\frac{8}{5\times2}\right)+V_2\left(\frac{1}{5}+\frac{1}{10}+\frac{1}{2}+\frac{8}{5\times2}\right)=0 \end{cases}$$

$$\begin{bmatrix} 0.75 & -.2 \\ -1 & 1.6 \end{bmatrix}\begin{bmatrix} V_1 \\ V_2 \end{bmatrix}=\begin{bmatrix} 10 \\ 0 \end{bmatrix}$$

$$\begin{bmatrix} V_1 \\ V_2 \end{bmatrix}=\begin{bmatrix} 0.75 & -.2 \\ -1 & 1.6 \end{bmatrix}^{-1}\begin{bmatrix} 10 \\ 0 \end{bmatrix}=\begin{bmatrix} 16 \\ 10 \end{bmatrix}$$

$$P_{5\Omega}=\frac{V^2}{R}=\frac{(V_2-V_1)^2}{5}=\frac{(10-16)^2}{5}=\frac{36}{5}=7.2\,W$$

Mesh



Loop ① $-50 + 5(i_1 - i_2) + 20(i_1 - i_3) = 0$ — ①

② $20(i_3 - i_1) + 4(i_3 - i_2) + 15 i_x = 0$ — ②

③ $5(i_2 - i_1) + 1 i_2 + 4(i_2 - i_3) = 0$ — ③

Mas $i_x = i_1 - i_3$.

② ⇒ $20(i_3 - i_1) + 4(i_3 - i_2) + 15(i_1 - i_3) = 0$.

Sistema
$$\begin{cases} i_1(5+20) + i_2(-5) + i_3(-20) = +50 \\ i_1(-20+15) + i_2(-4) + i_3(20+4-15) = 0 \\ i_1(-5) + i_2(5+1+4) + i_3(-4) = 0 \end{cases}$$

$i_1 = 29.6\,A$
$i_2 = 26\,A$
$i_3 = 28\,A$