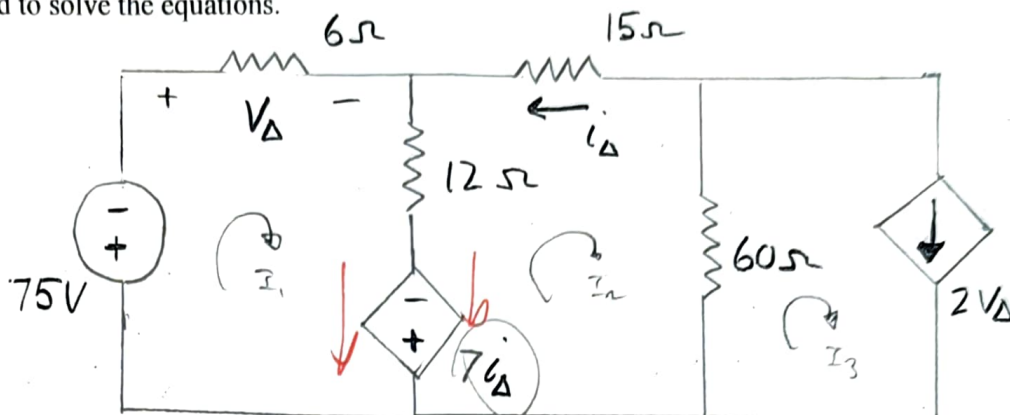


Name: Trevor N.Lab Section (circle one): MA MB TA TE WA ThA

Problem 1 (10 points): For the following circuit, write all the equations necessary to calculate the power associated with the dependent voltage source using the mesh-current method. You do not need to simplify the equations and you do not need to solve the equations.



Mesh-
current
eq.

$$\begin{bmatrix} 18 & -12 & 0 \\ -12 & 87 & -60 \\ 0 & -60 & 0 \end{bmatrix} \begin{bmatrix} I_1 \\ I_\Delta \\ I_2 \end{bmatrix} = \begin{bmatrix} -75 + 7I_\Delta \\ 7I_\Delta \\ V_3 \end{bmatrix}$$

$$P = -7I_\Delta (I_1 + I_\Delta)$$

$$-0.25$$

where did $i_3 = 12I_1$
come from?

please write it in
actual equation form,
linear algebra is cool but like
just write
the equations

it is just $i_3 = 2V_\Delta$

based on current direction it should be negative

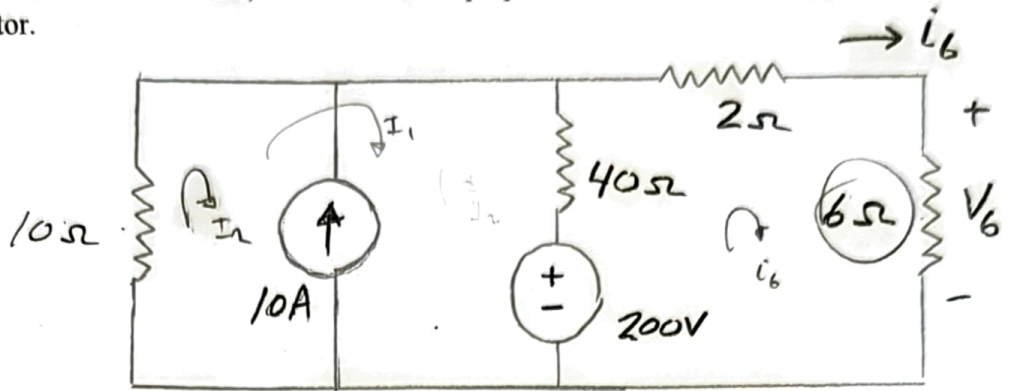
please do it the way we did it
in class or give more thorough
explanations -0.25

passive sign convention!!

8/10

Name: Trewn N.Lab Section (circle one): MA MB TA TE WA ThA

Problem 2 (10 points): For the circuit shown below, use the source superposition method to calculate the total power dissipated in the 6Ω resistor.



With 10A only:

$$\begin{bmatrix} 50 & 10 & -40 \\ 10 & 10 & 0 \\ -40 & 0 & 48 \end{bmatrix} \begin{bmatrix} I_1' \\ -I_2' \\ i_b' \end{bmatrix} = \begin{bmatrix} 0 \\ -10 \\ 0 \end{bmatrix}$$

$$\begin{cases} 50I_1' - 100 - 40i_b' = 0 \\ 10I_1' - 100 = V_2' \\ -40I_1' + 48i_b' = 0 \end{cases} \Rightarrow \begin{cases} I_1' = \frac{V_2'}{10} + 10 \\ \frac{V_2' + 25}{3} = i_b' \\ 5V_2' + 500 - 100 - \frac{10V_2'}{3} - \frac{1000}{3} = 0 \end{cases}$$

$V_2' = -40$
 $i_b' = 5$

invalid equations
please draw circuit

With 200V only:

$$\begin{bmatrix} 50 & -40 \\ -40 & 48 \end{bmatrix} \begin{bmatrix} I_1'' \\ i_b'' \end{bmatrix} = \begin{bmatrix} -200 \\ 200 \end{bmatrix}$$

$$\begin{bmatrix} I_1'' \\ i_b'' \end{bmatrix} = \begin{bmatrix} -2 \\ 5/2 \end{bmatrix}$$

$$i_b = i_b' + i_b''$$

$$i_b = \frac{15}{2}$$

$$V_b = 45$$

$$P = \frac{675}{2} \text{ W}$$