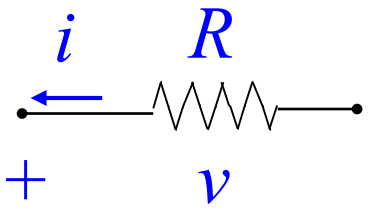
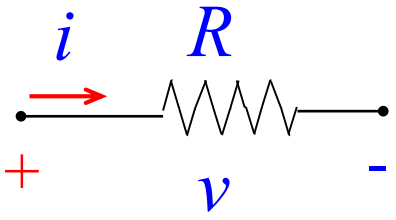
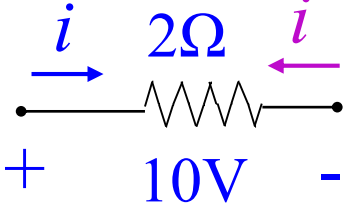


$v = iR$? x

$\boldsymbol{v = -iR}$ √

$v = iR$

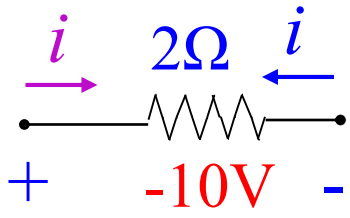




$i = 5\text{A}$

$i = -5\text{A}$

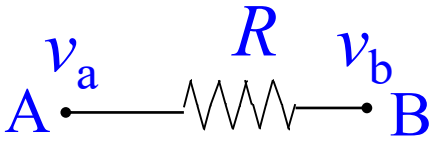
? √



$i = 5\text{A}$

$i = -5\text{A}$

?

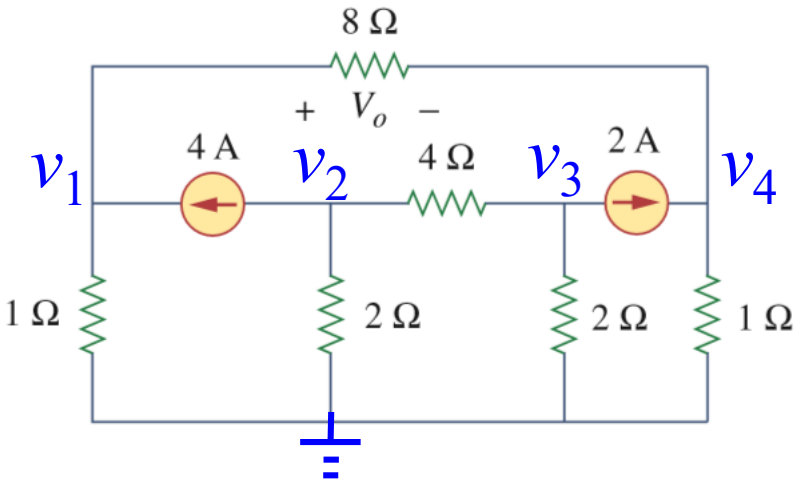


Current flowing into node A:

$$\frac{v_b - v_a}{R}$$

Current flowing out of node A:

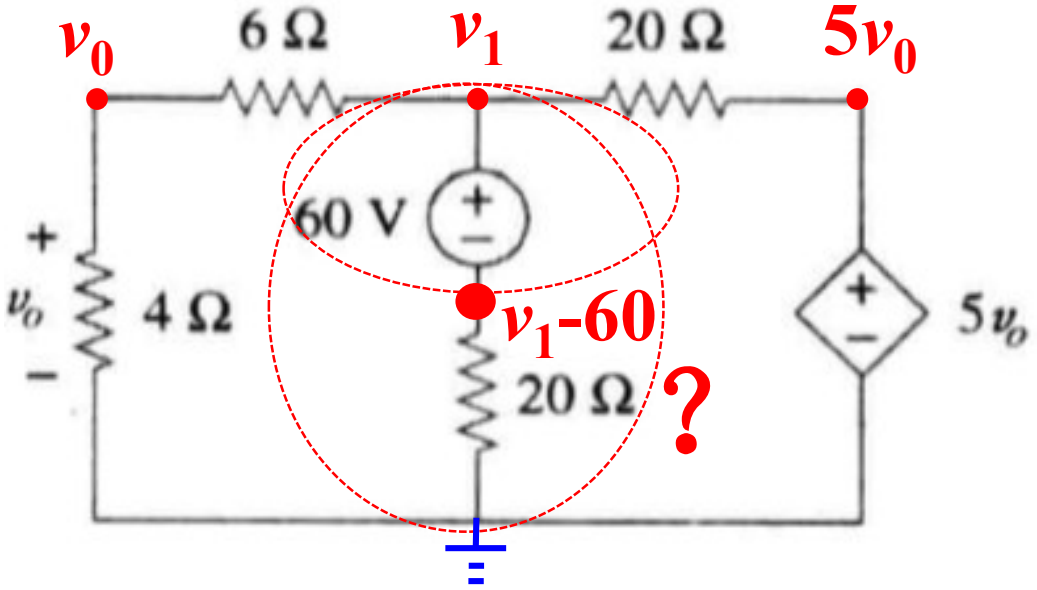
$$\frac{v_a - v_b}{R}$$



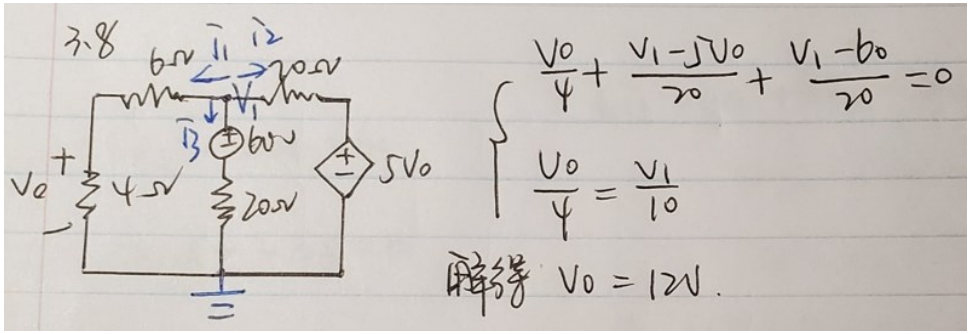
3.8 P115

A supernode is formed by enclosing a voltage source (dependant or independent) connected between two non-reference nodes and any elements connected in parallel with it.

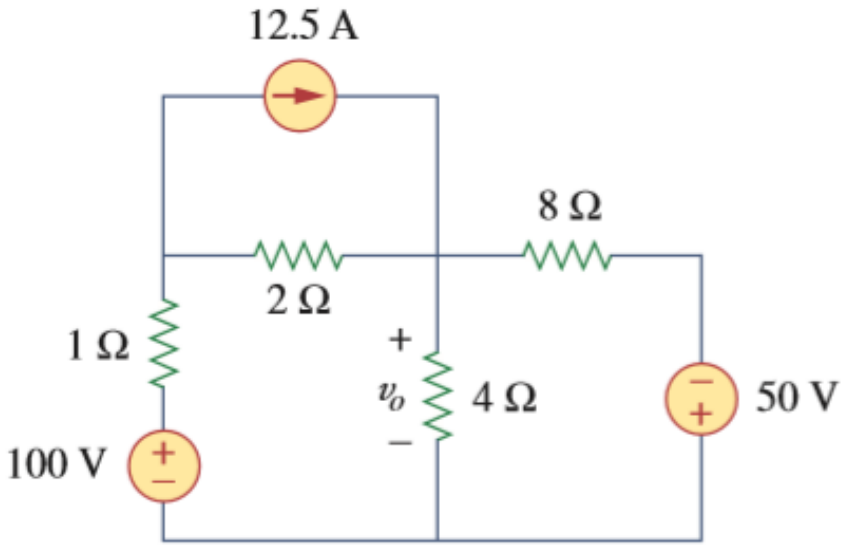
Using nodal analysis, find v_o in the circuit of Fig. 3.57.



What to do

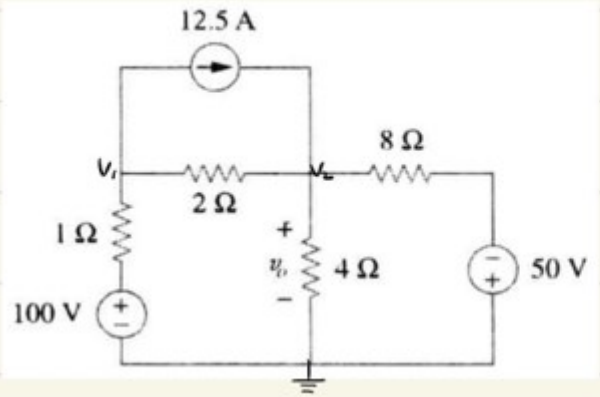


3.14 Using nodal analysis, find v_o in the circuit of Fig. 3.63.



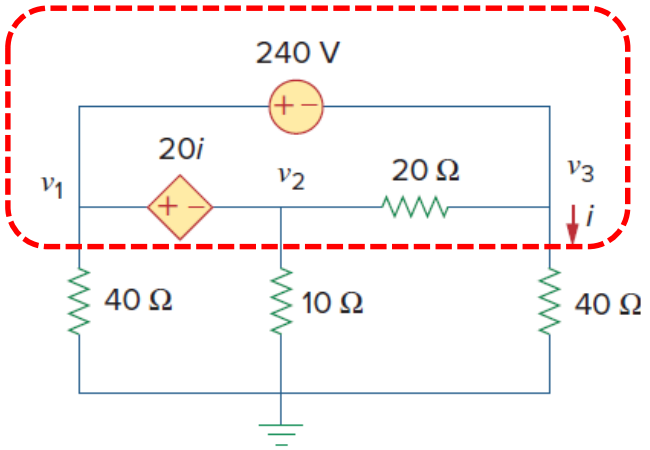
3.14

Solution:



$$\begin{cases} \frac{V_1-100}{1}+12.5+\frac{V_1-V_2}{2}=0 \\ \frac{V_1-V_2}{2}+12.5=\frac{V_2}{4}+\frac{V_2+50}{8} \\ V_o=V_2 \end{cases} \Rightarrow V_o=50V$$

3.20 For the circuit in Fig. 3.69, find v_1, v_2, and v_3 using nodal analysis.



Solution:

$v_1 + v_2 + v_3$: $\frac{v_1}{40} + \frac{v_2}{10} + \frac{v_3}{40} = 0$

$v_1 - v_2 = 20i$

$v_1 - v_3 = 240$

$i = \frac{v_3}{40}$

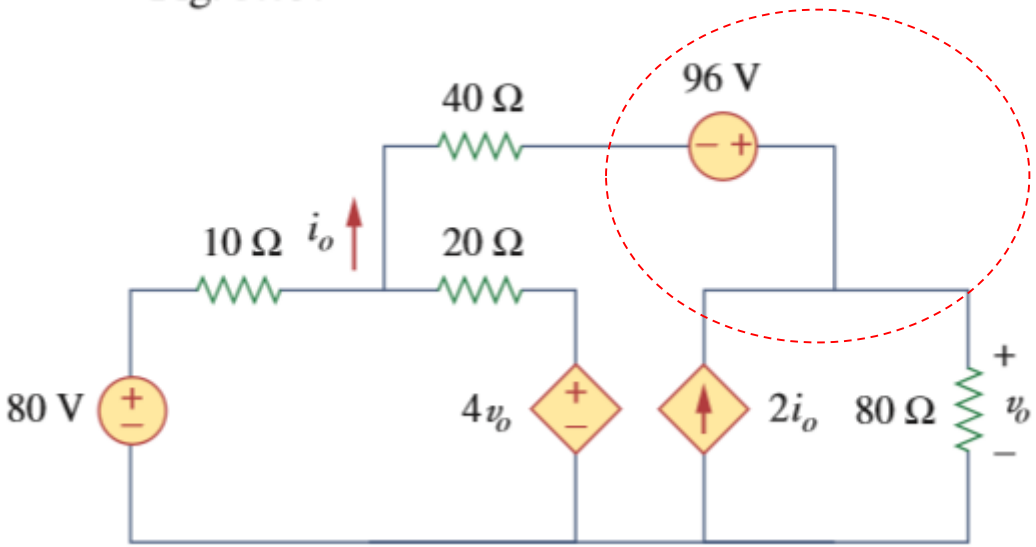
$\Rightarrow$

$v_1 = -60\text{V}$

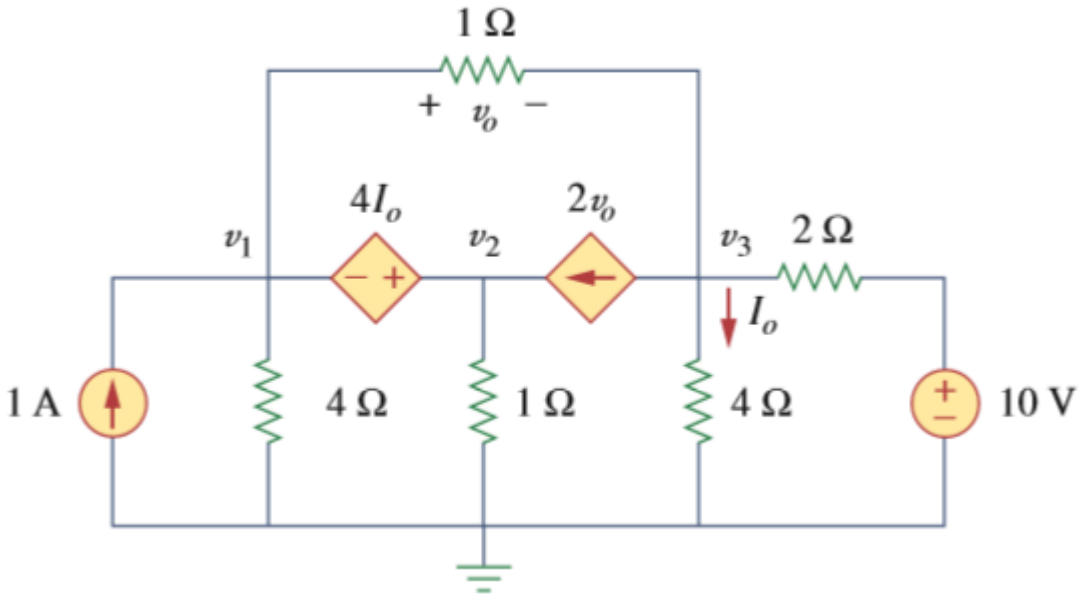
$v_2 = 90\text{V}$

$v_3 = -300\text{V}$

3.30 Using nodal analysis, find v_o and i_o in the circuit of Fig. 3.79.

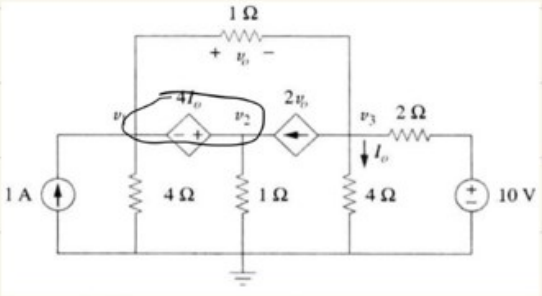


3.31 Find the node voltages for the circuit in Fig. 3.80.



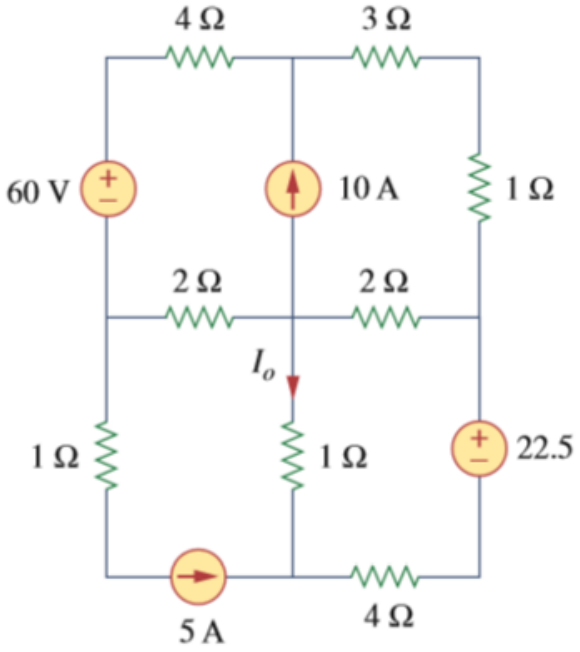
3.31

Solution:

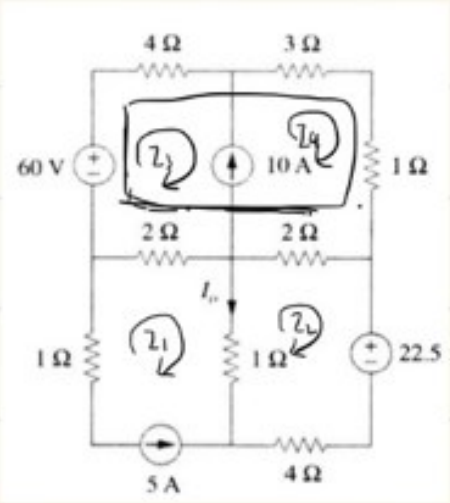


$$\begin{cases} 1+2V_0=\frac{V_1}{4}+\frac{V_2}{1}+\frac{V_1-V_3}{1} \\ \frac{V_1-V_3}{1}+\frac{10-V_3}{2}=2V_0+\frac{V_3}{4} \\ V_0=V_1-V_3 \\ V_2-V_1=4I_0 \\ I_0=\frac{V_3}{4} \end{cases} \Rightarrow \begin{cases} V_1=4.97V \\ V_2=4.85V \\ V_3=-0.12V \end{cases}$$

3.38 Apply mesh analysis to the circuit in Fig. 3.85 and obtain I_o.



Solution:



I_1: $I_1 = -5$ A

I_2: $1(I_2 - I_1) + 2(I_2 - I_4) + 22.5 + 4I_2 = 0$

Super mesh: $-60 + 4I_3 + 3I_4 + 1I_4 + 2(I_4 - I_2) + 2(I_3 - I_1) = 0$

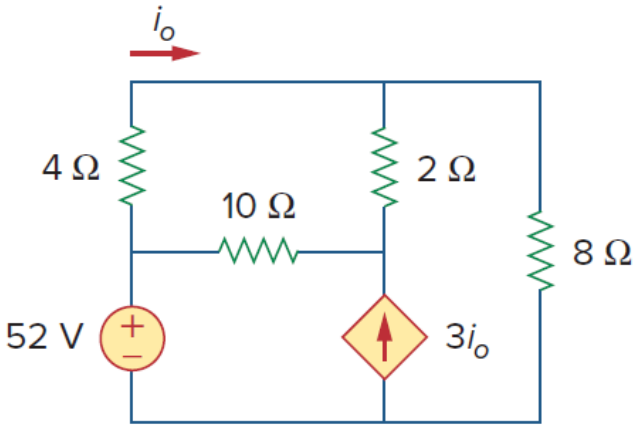
$I_{3,4}$: $I_4 - I_3 = 10$ A

$I_o = I_1 - I_2$

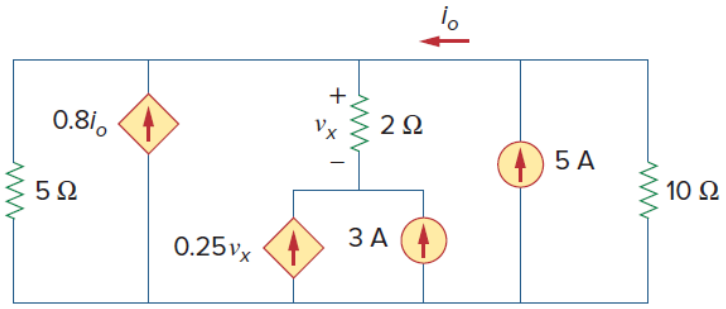
$\frac{-29}{8}$

$\Rightarrow I_o = -\frac{51}{8}$ A

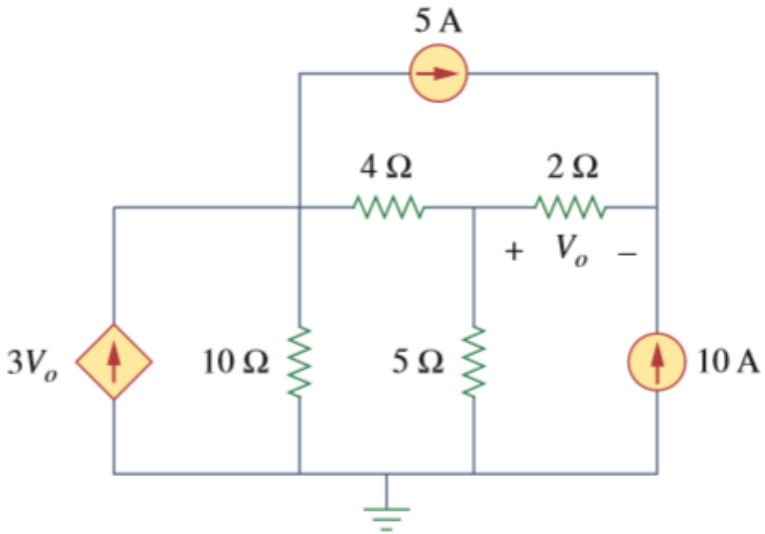
3.50 Use mesh analysis to find the current io in the circuit of Fig. 3.95.



3.63 Find v_x and i_0 in the circuit shown in Fig. 3.107.



3.67 Obtain the node-voltage equations for the circuit in Fig. 3.111 by inspection. Then solve for V_o.



3.73 Write the mesh-current equations for the circuit in Fig. 3.117.