

Electrical Circuit (1)

Introduction (week3 class2)

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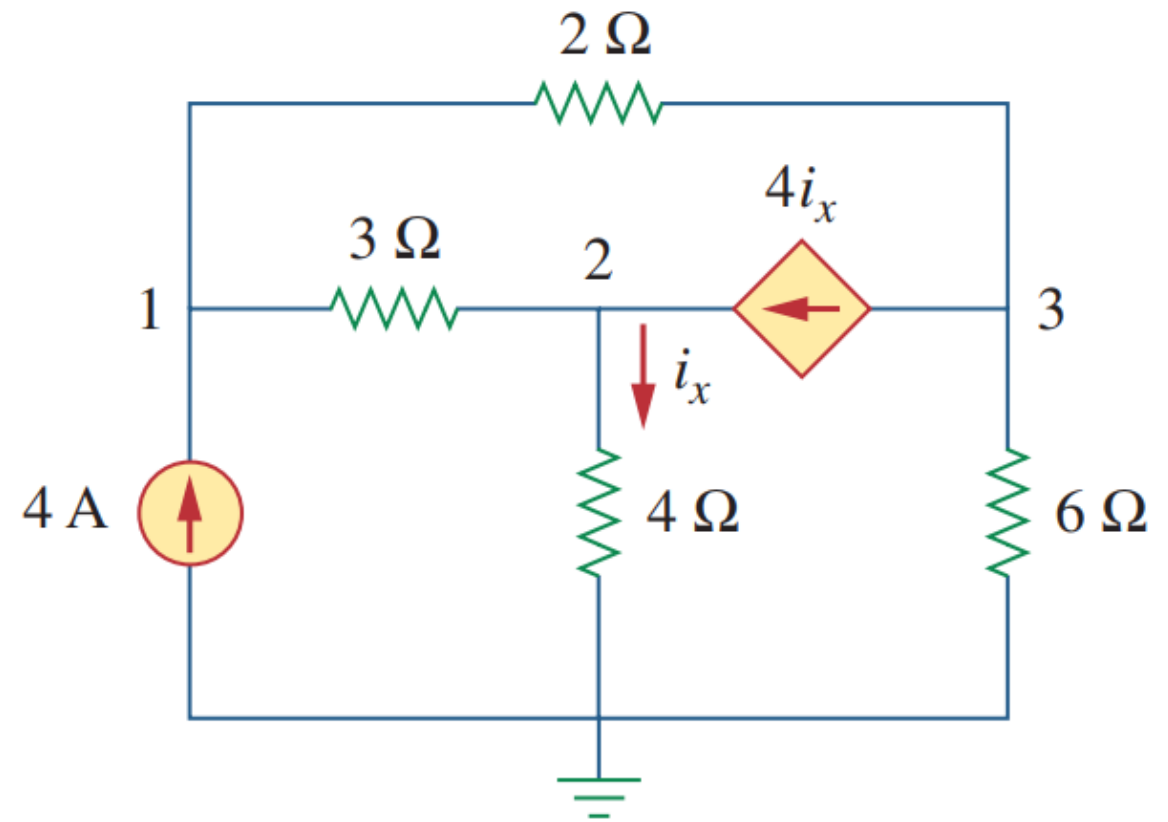
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Advanced

Nodal Analysis



Basic equation

$$-4 + \frac{V_1 - V_2}{3} + \frac{V_1 - V_3}{2} = 0$$

$$\frac{V_2 - V_1}{3} + \frac{V_2}{4} - 4 \frac{V_2}{4} = 0$$

$$\frac{V_3 - V_1}{2} + \frac{V_3}{6} + 4 \frac{V_2}{4} = 0$$

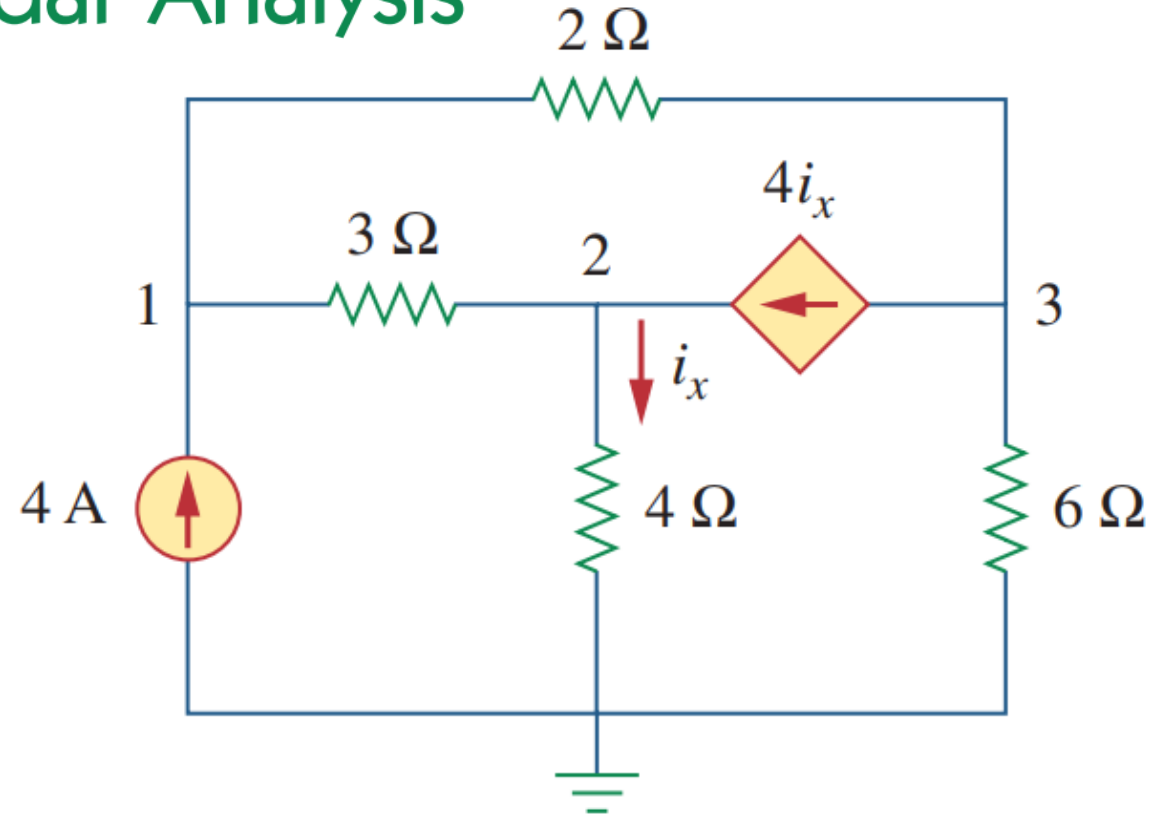
Formulated equation

$$\left(\frac{1}{3} + \frac{1}{2}\right)V_1 - \left(\frac{1}{3}\right)V_2 - \left(\frac{1}{2}\right)V_3 = 4$$

$$\left(\frac{-1}{3}\right)V_1 + \left(\frac{1}{3} + \frac{1}{4} - \frac{4}{4}\right)V_2 = 0$$

$$\left(\frac{-1}{2}\right)V_1 + \left(\frac{4}{4}\right)V_2 + \left(\frac{1}{2} + \frac{1}{6}\right)V_3 = 0$$

Nodal Analysis



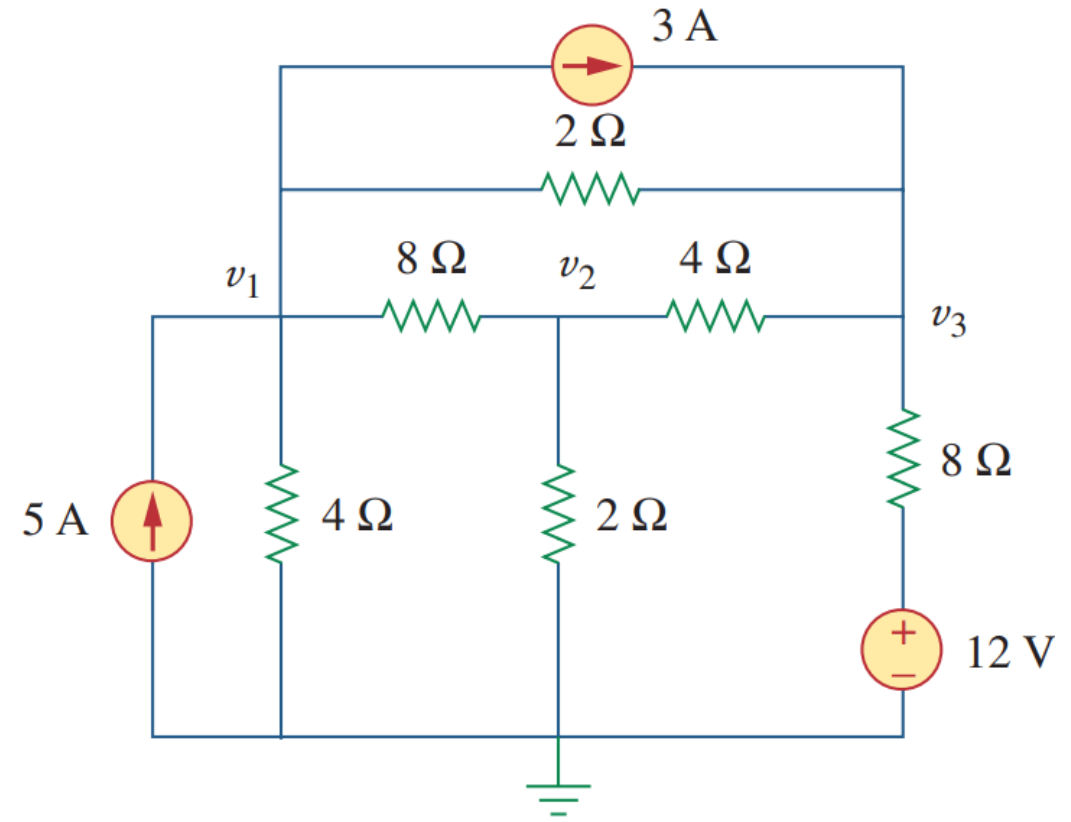
Final answer

$$V_1 = 32 V$$

$$V_2 = -25.6 V$$

$$V_3 = 62.4 V$$

Nodal Analysis



Basic equation

$$-5 + \frac{V_1}{4} + \frac{V_1 - V_2}{8} + \frac{V_1 - V_3}{2} + 3 = 0$$

$$\frac{V_2 - V_1}{8} + \frac{V_2 - V_3}{4} + \frac{V_2}{2} = 0$$

$$-3 + \frac{V_3 - V_1}{2} + \frac{V_3 - V_2}{4} + \frac{V_3 - 12}{8} = 0$$

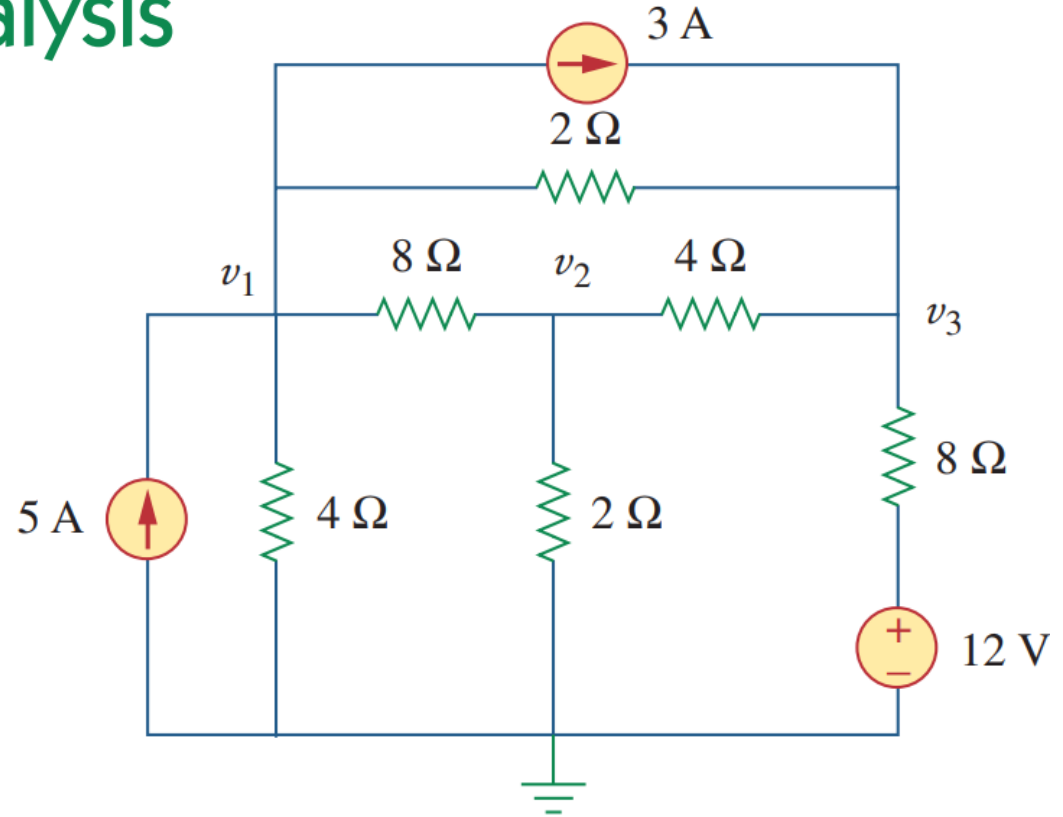
Formulated equation

$$\left(\frac{1}{4} + \frac{1}{8} + \frac{1}{2}\right)V_1 - \left(\frac{1}{8}\right)V_2 - \left(\frac{1}{2}\right)V_3 = 5 - 3$$

$$\left(\frac{-1}{8}\right)V_1 + \left(\frac{1}{8} + \frac{1}{4} + \frac{1}{2}\right)V_2 + \left(\frac{-1}{4}\right)V_3 = 0$$

$$\left(\frac{-1}{2}\right)V_1 + \left(-\frac{1}{4}\right)V_2 + \left(\frac{1}{2} + \frac{1}{4} + \frac{1}{8}\right)V_3 = 3 + \frac{12}{8}$$

Nodal Analysis

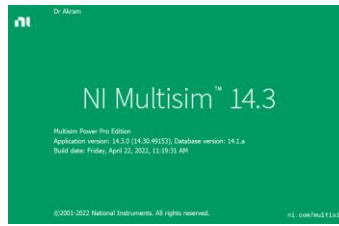


Final answer

$$V_1 = 10 \text{ V}$$

$$V_2 = 4.9333 \text{ V}$$

$$V_3 = 12.2666 \text{ V}$$



Design1 - Multisim - [Design1]

File Edit View Place Simulate Transfer Tools Reports Options Window Help

--- In-Use List ---

Interactive

Design Tool

- Design1
 - Design1

Hierarchy | Design1

Multisim - Friday, November 1, 2024, 12:11:52 PM

Results | Nets | Components | Copper layers | Simulation

For Help, press F1

