

Electrical Circuit (1)

Introduction (week4 class1)

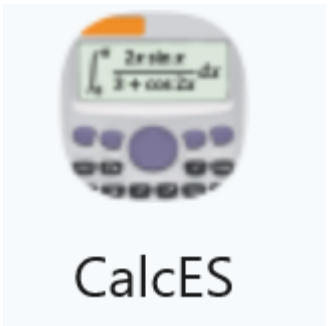
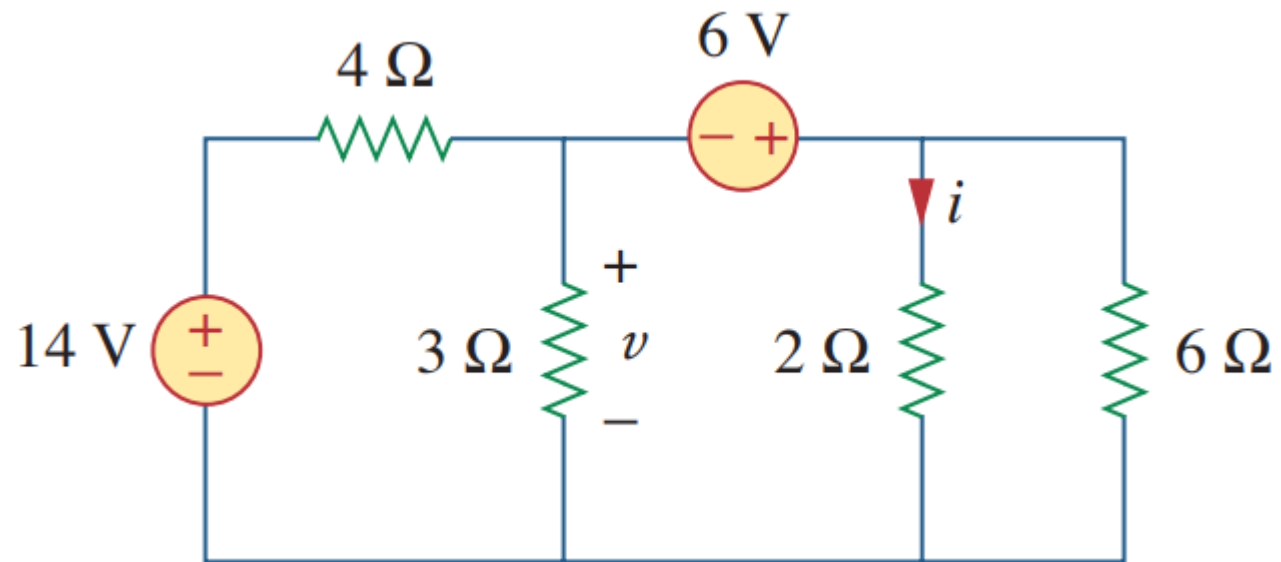
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Nodal Analysis with Voltage Sources



Nodal Analysis with Voltage Sources

Basic equation

$$V_1 + 6 = V_2$$

$$\frac{V_1 - 14}{4} + \frac{V_1}{3} + \frac{V_2}{2} + \frac{V_2}{6} = 0$$

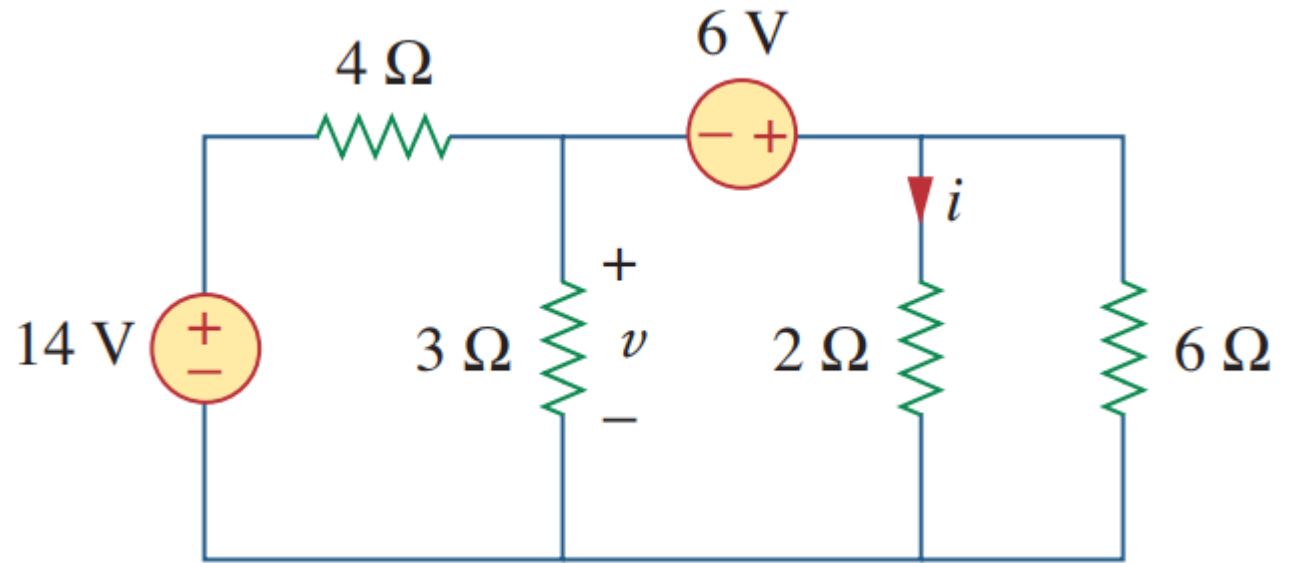
Formulated equation

$$V_1 - V_2 = -6$$

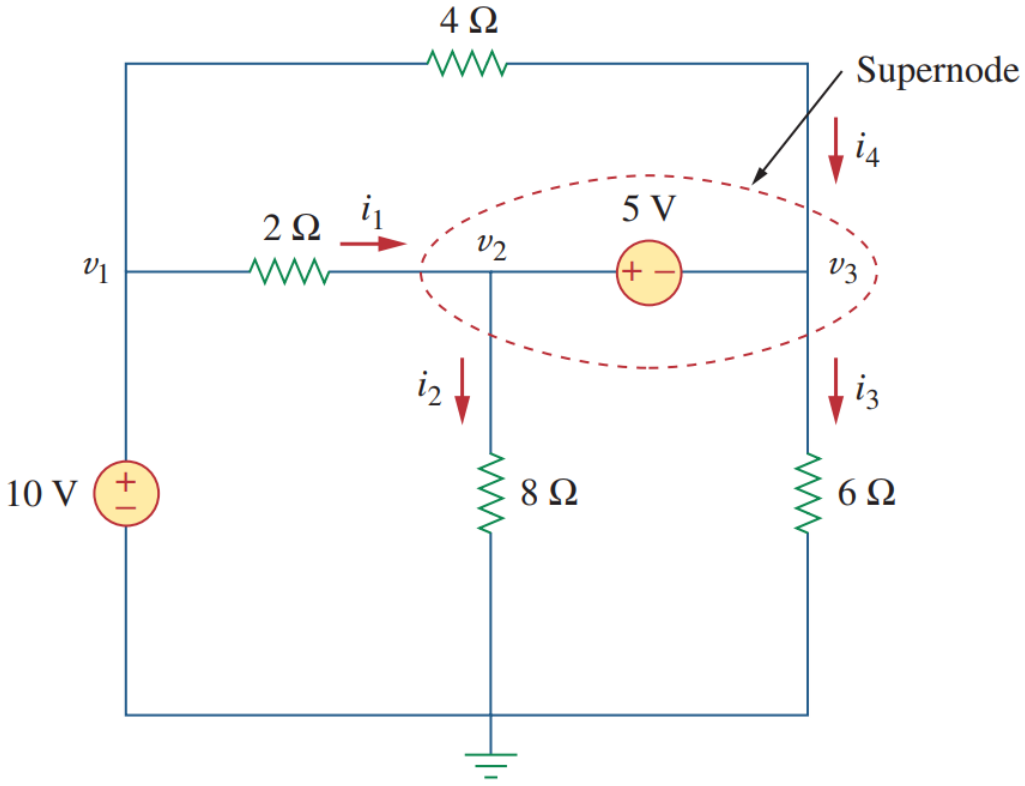
$$\left(\frac{1}{4} + \frac{1}{3}\right)V_1 + \left(\frac{1}{2} + \frac{1}{6}\right)V_2 = \frac{14}{4}$$

Final answer

$$V_1 = -0.4 \text{ mV} \quad V_2 = 5.6 \text{ V}$$



Nodal Analysis with Voltage Sources



Nodal Analysis with Voltage Sources

Basic equation

$$V_1 = 10$$

$$V_3 + 5 = V_2$$

$$\frac{V_2 - V_1}{2} + \frac{V_2}{8} + \frac{V_3 - V_1}{4} + \frac{V_3}{6} = 0$$

Formulated equation

$$V_2 - V_3 = 5$$

$$\frac{V_2 - 10}{2} + \frac{V_2}{8} + \frac{V_3 - 10}{4} + \frac{V_3}{6} = 0 \quad \left(\frac{1}{2} + \frac{1}{8}\right)V_2 + \left(\frac{1}{4} + \frac{1}{6}\right)V_3 = \frac{10}{2} + \frac{10}{4}$$

Final answer

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

$$V_2 = 9.2 \text{ V}$$

$$V_3 = 4.2 \text{ V}$$

