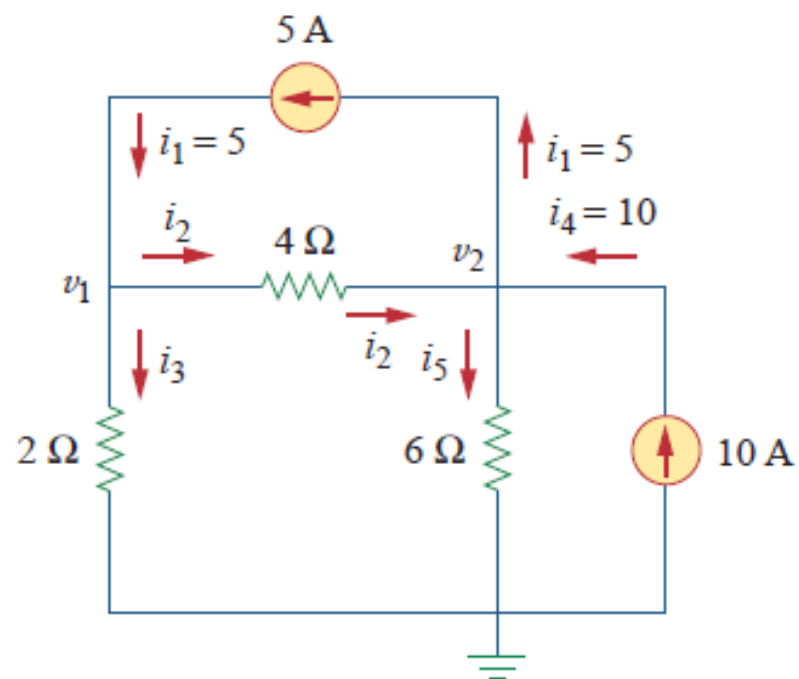


$$i_1 = i_2 + i_3$$

$$5 = \frac{v_1 - v_2}{4} + \frac{v_1 - 0}{2}$$

$$20 = v_1 - v_2 + 2v_1$$

$$3v_1 - v_2 = 20$$

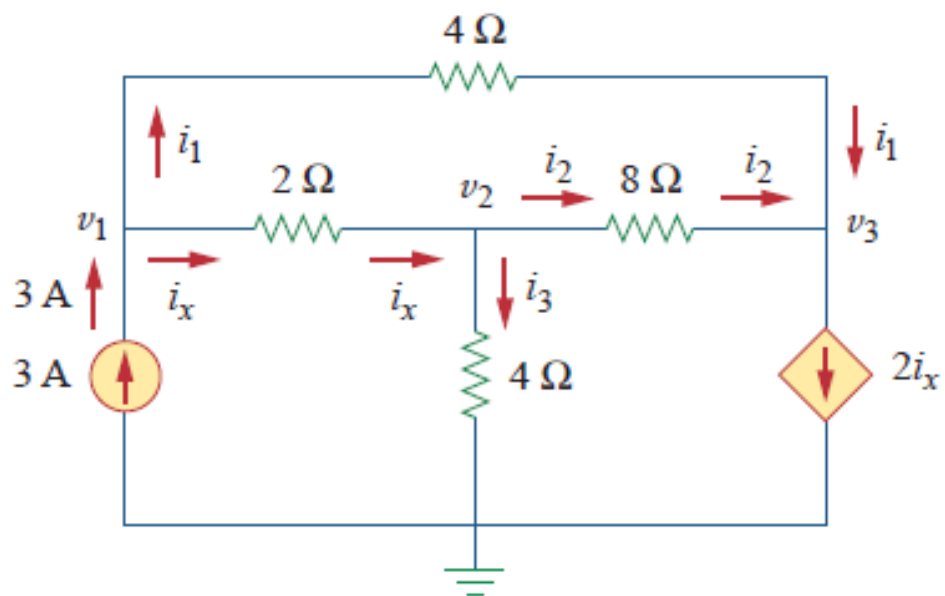
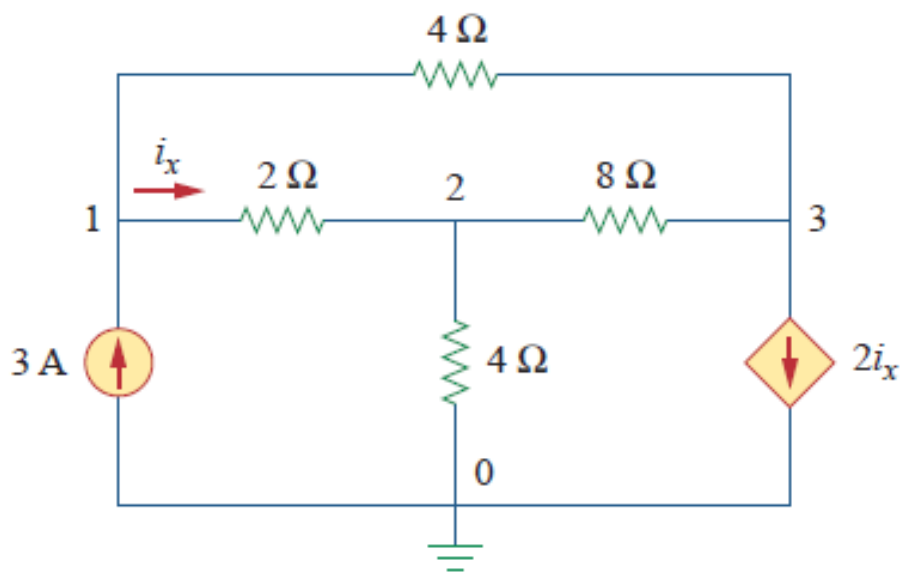


$$i_2 + i_4 = i_1 + i_5$$

$$\frac{v_1 - v_2}{4} + 10 = 5 + \frac{v_2 - 0}{6}$$

$$3v_1 - 3v_2 + 120 = 60 + 2v_2$$

$$-3v_1 + 5v_2 = 60$$





$$3 = i_1 + i_x$$

$$3 = \frac{v_1 - v_3}{4} + \frac{v_1 - v_2}{2}$$

$$3v_1 - 2v_2 - v_3 = 12$$

$$i_x = i_2 + i_3$$

$$\frac{v_1 - v_2}{2} = \frac{v_2 - v_3}{8} + \frac{v_2 - 0}{4}$$

$$-4v_1 + 7v_2 - v_3 = 0$$

$$i_1 + i_2 = 2i_x$$

$$\frac{v_1 - v_3}{4} + \frac{v_2 - v_3}{8} = \frac{2(v_1 - v_2)}{2}$$

$$2v_1 - 3v_2 + v_3 = 0$$

$$3v_1 - 2v_2 - v_3 = 12$$

$$-4v_1 + 7v_2 - v_3 = 0$$

$$2v_1 - 3v_2 + v_3 = 0$$

$$5v_1 - 5v_2 = 12$$

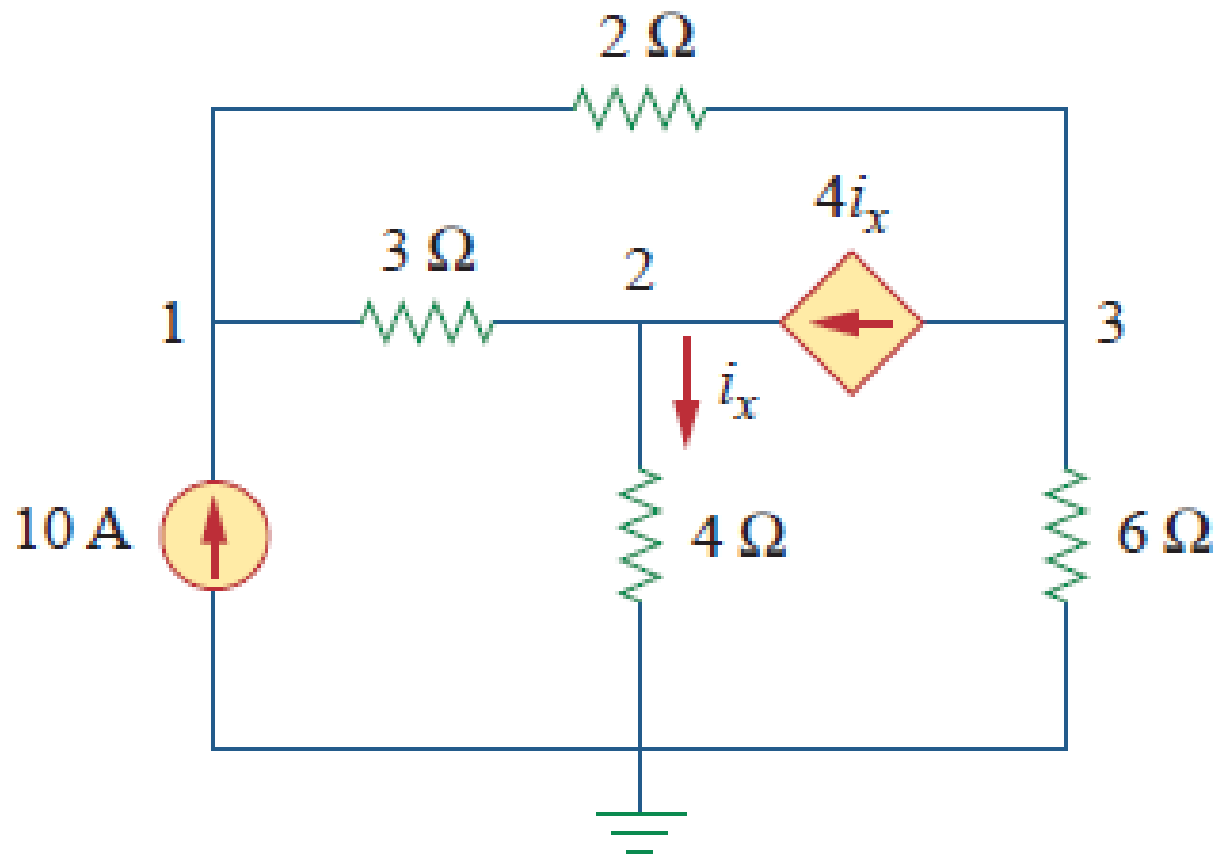
$$v_1 - v_2 = \frac{12}{5} = 2.4$$

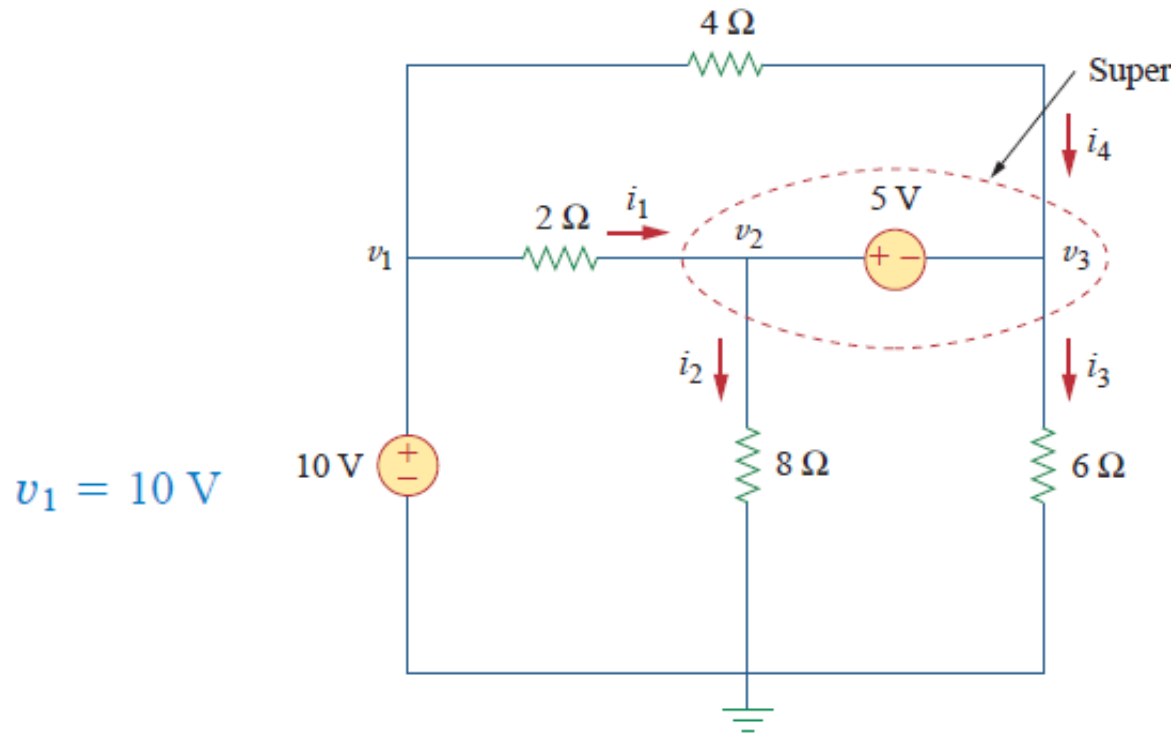
$$-2v_1 + 4v_2 = 0 \quad \Rightarrow \quad v_1 = 2v_2$$

$$2v_2 - v_2 = 2.4 \quad \Rightarrow \quad v_2 = 2.4, \quad v_1 = 2v_2 = 4.8 \text{ V}$$

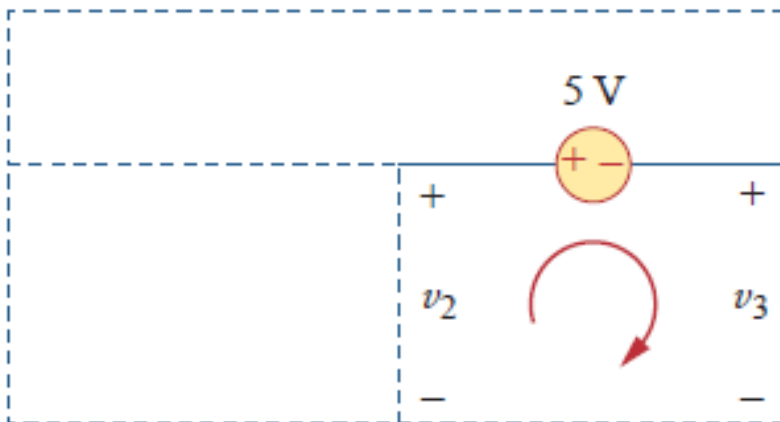
$$v_3 = 3v_2 - 2v_1 = 3v_2 - 4v_2 = -v_2 = -2.4 \text{ V}$$

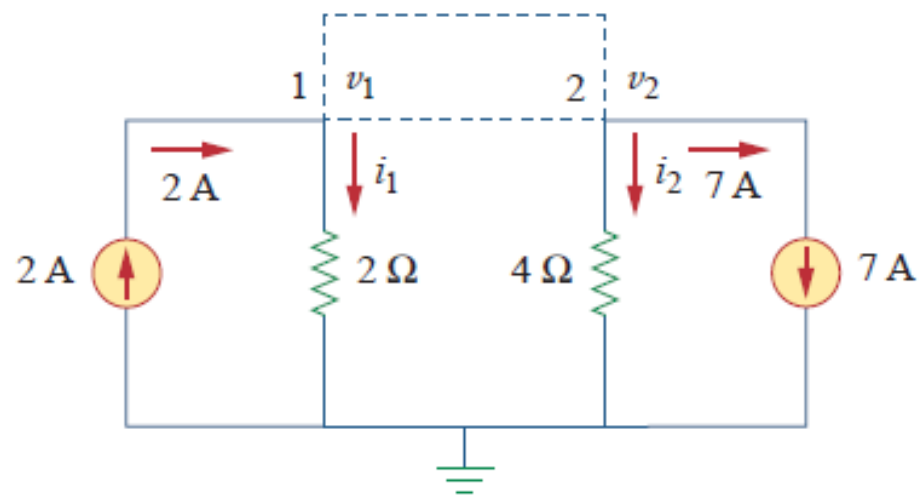
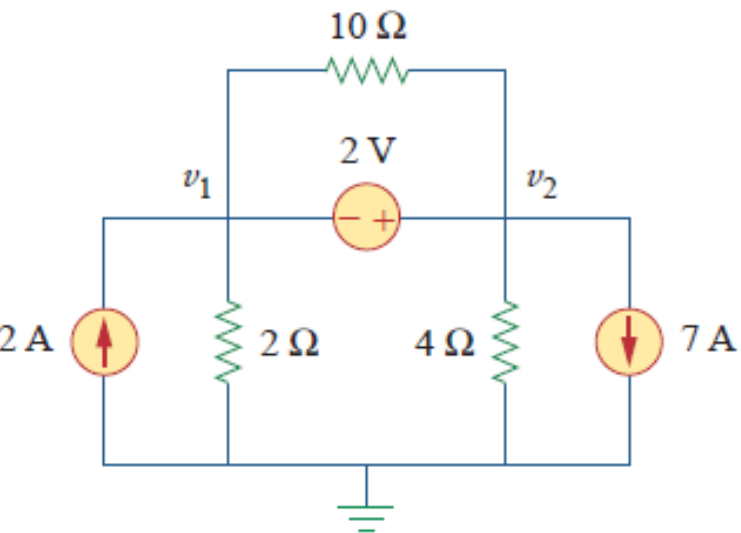
$$v_1 = 4.8 \text{ V}, \quad v_2 = 2.4 \text{ V}, \quad v_3 = -2.4 \text{ V}$$





$$v_2 - v_3 = 5$$





$$2 = i_1 + i_2 + 7$$

$$2 = \frac{v_1 - 0}{2} + \frac{v_2 - 0}{4} + 7$$

$$8 = 2v_1 + v_2 + 28$$

$$v_2 = -20 - 2v_1$$

$$v_2 = v_1 + 2$$

$$v_2 = v_1 + 2 = -20 - 2v_1$$

$$3v_1 = -22 \quad \Rightarrow \quad v_1 = -7.333 \text{ V}$$

