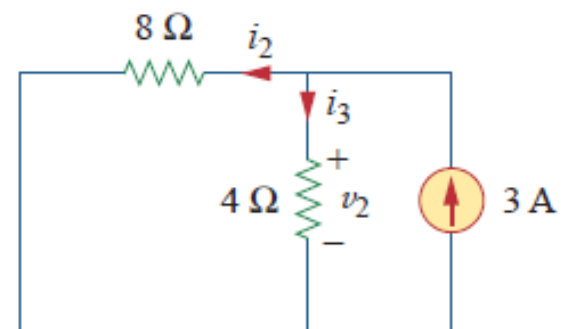


$$12i_1 - 6 = 0 \quad \Rightarrow \quad i_1 = 0.5 \text{ A}$$

$$v_1 = 4i_1 = 2 \text{ V}$$

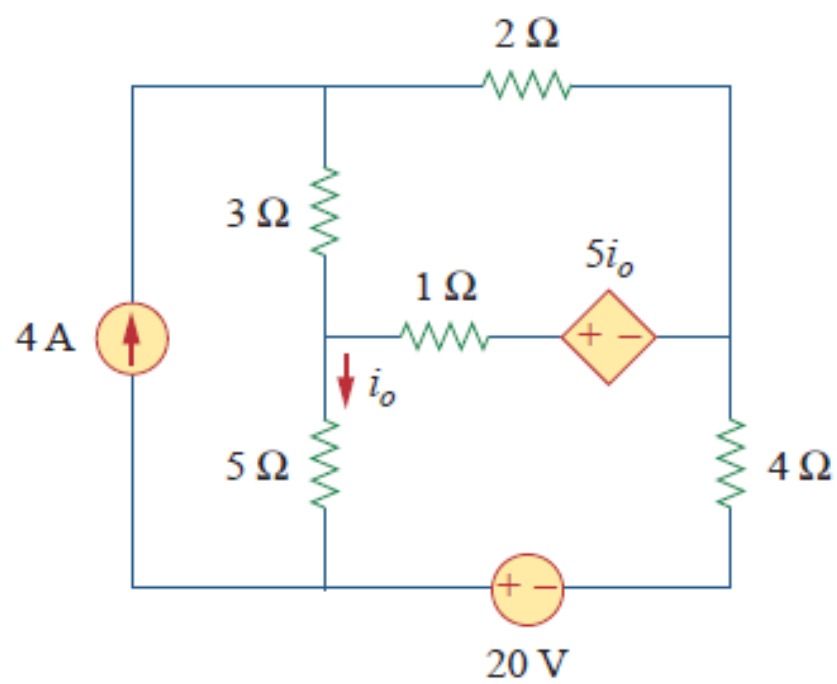


$$i_3 = \frac{8}{4 + 8}(3) = 2 \text{ A}$$

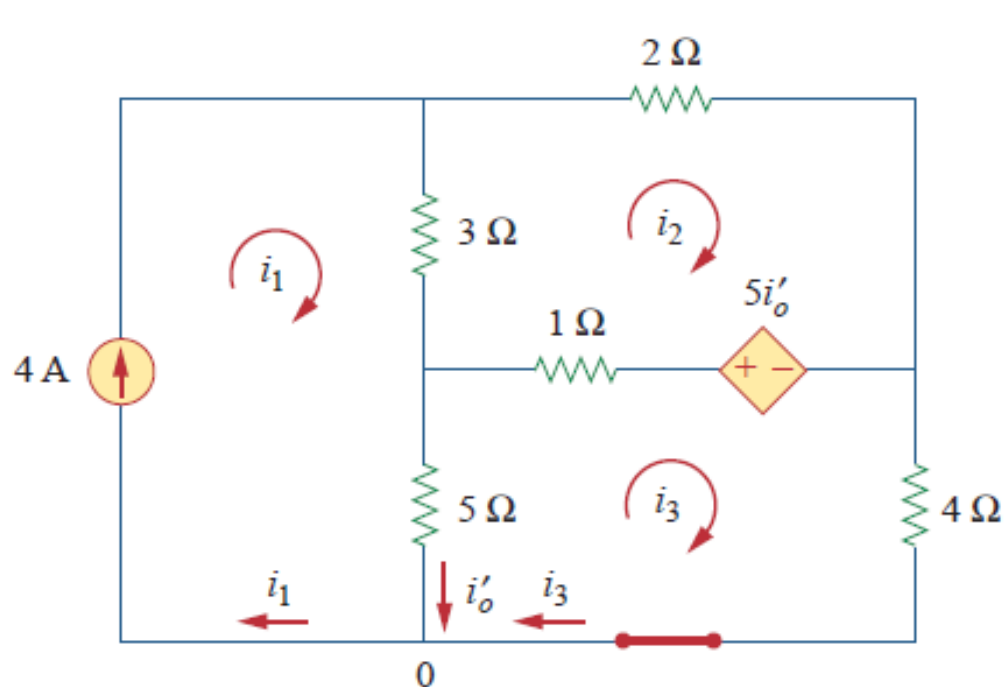
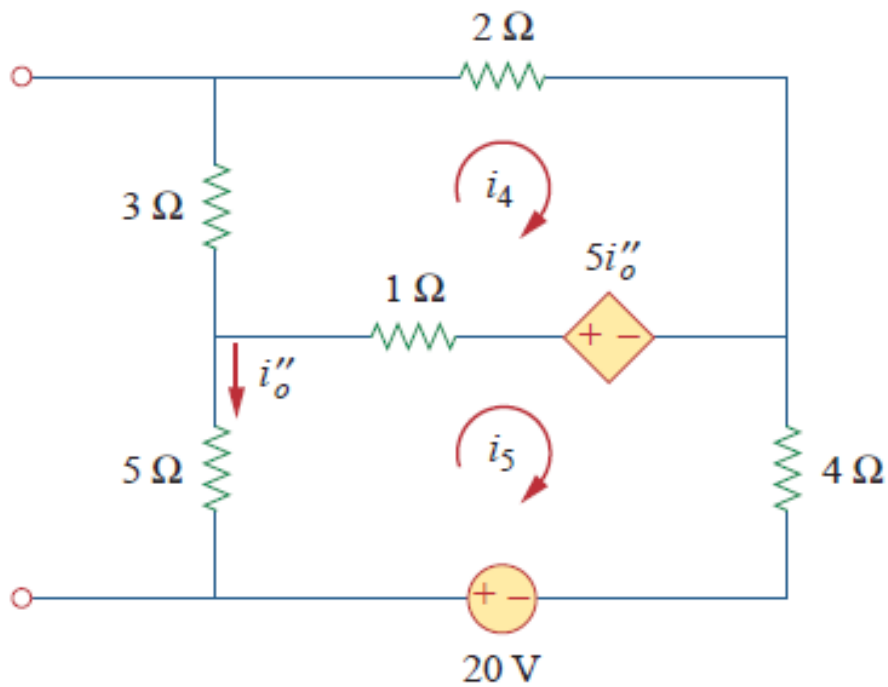
$$v_2 = 4i_3 = 8 \text{ V}$$

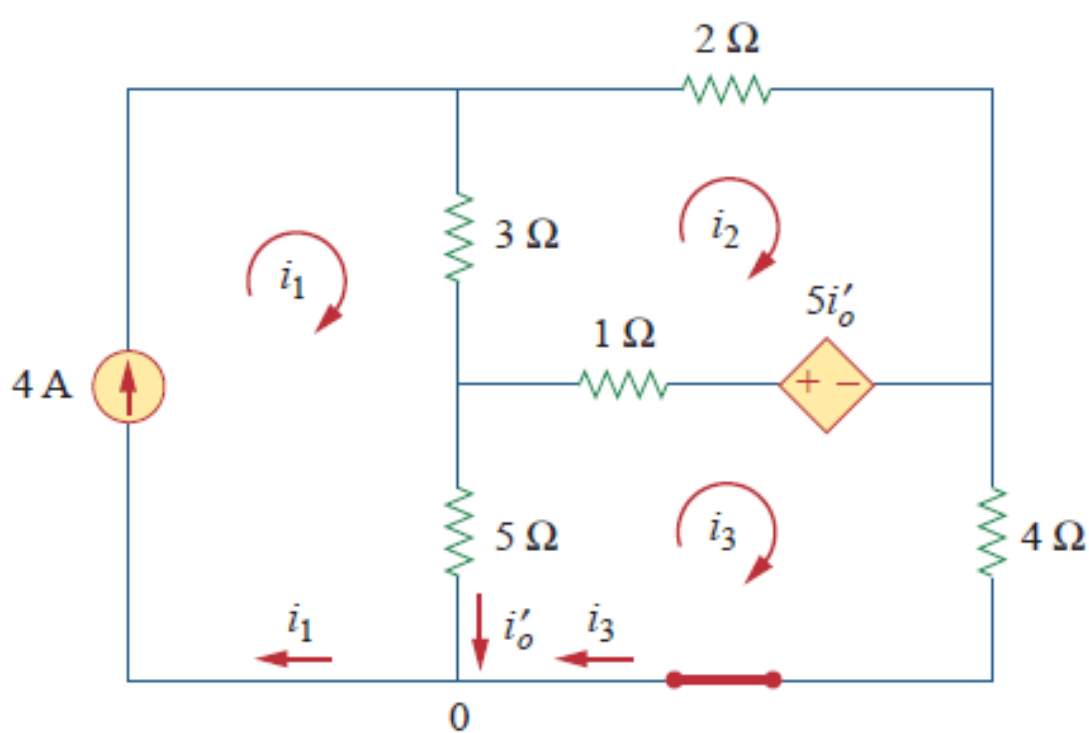
$$v = v_1 + v_2$$

$$v = v_1 + v_2 = 2 + 8 = 10 \text{ V}$$



$$i_o = i'_o + i''_o$$





$$i_1 = 4 \text{ A}$$

For loop 2

$$-3i_1 + 6i_2 - 1i_3 - 5i'_o = 0$$

For loop 3

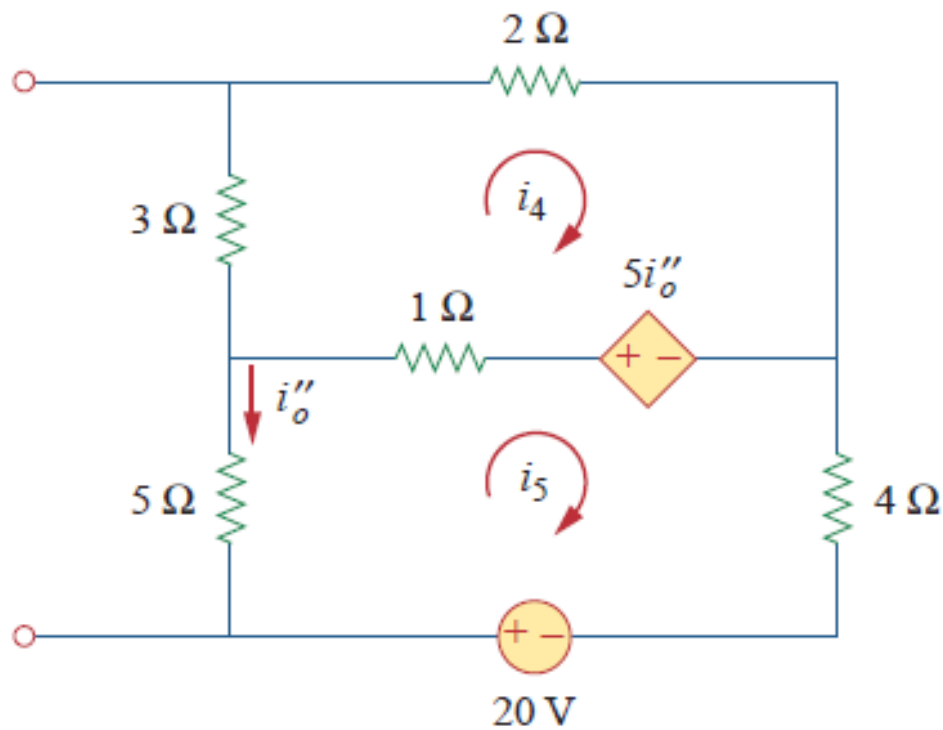
$$-5i_1 - 1i_2 + 10i_3 + 5i'_o = 0$$

$$i_3 = i_1 - i'_o = 4 - i'_o$$

$$3i_2 - 2i'_o = 8$$

$$i'_o = \frac{52}{17} \text{ A}$$

$$i_2 + 5i'_o = 20$$



$$6i_4 - i_5 - 5i''_o = 0$$

$$-i_4 + 10i_5 - 20 + 5i''_o = 0$$

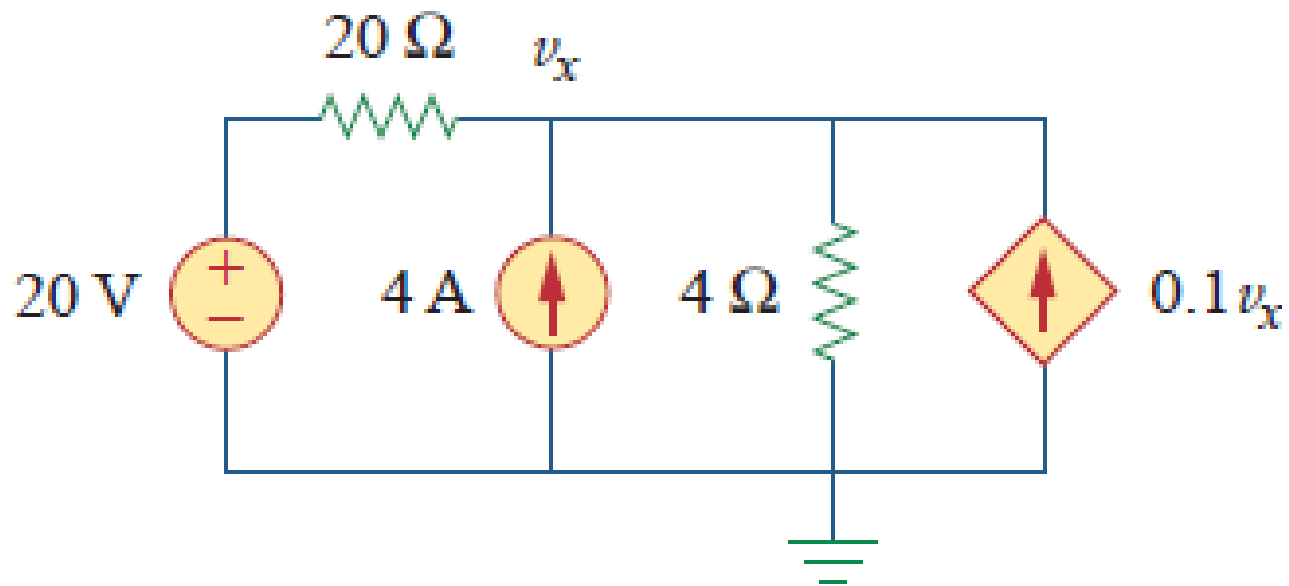
$$i_5 = -i''_o.$$

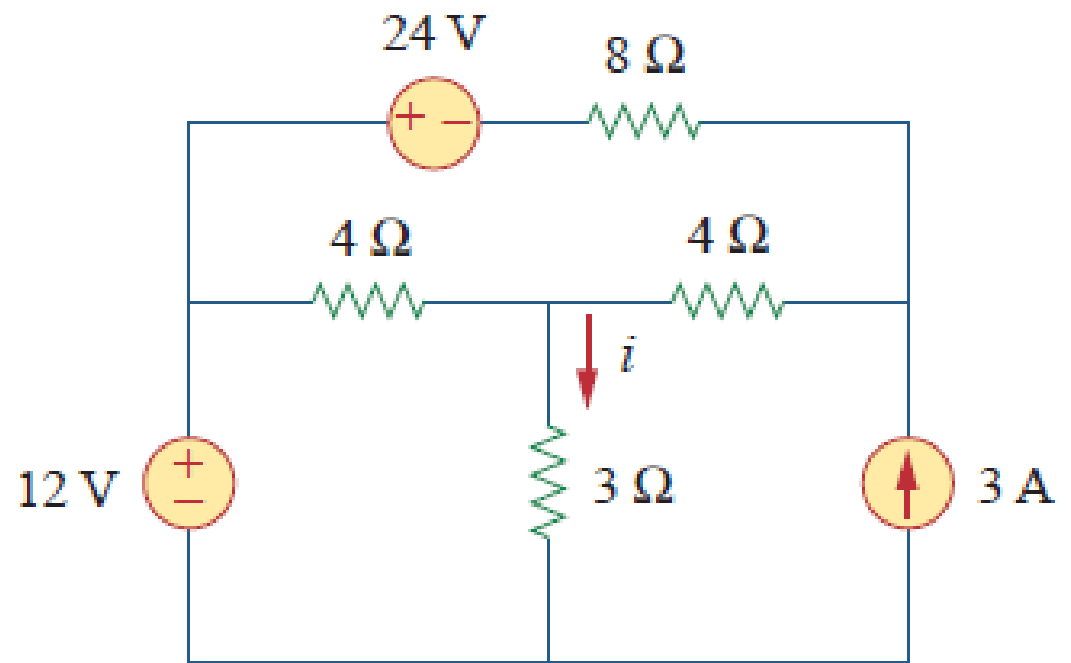
$$6i_4 - 4i''_o = 0$$

$$i_4 + 5i''_o = -20$$

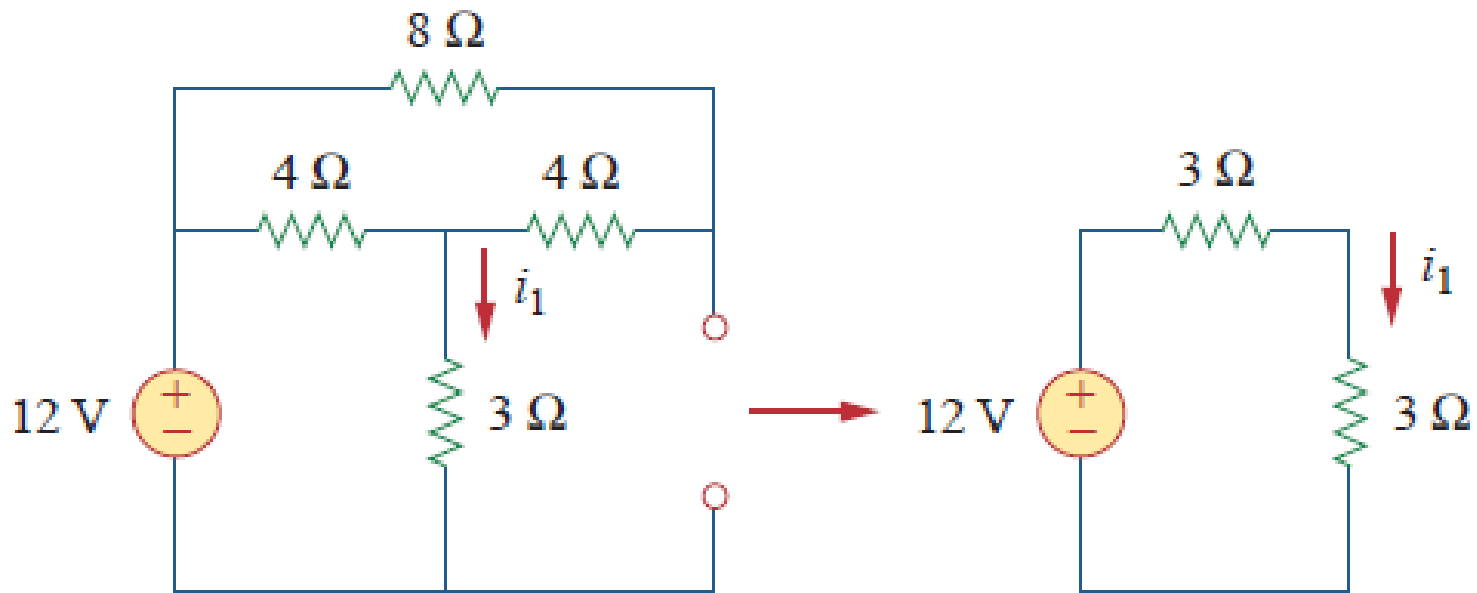
$$i''_o = -\frac{60}{17} \text{ A}$$

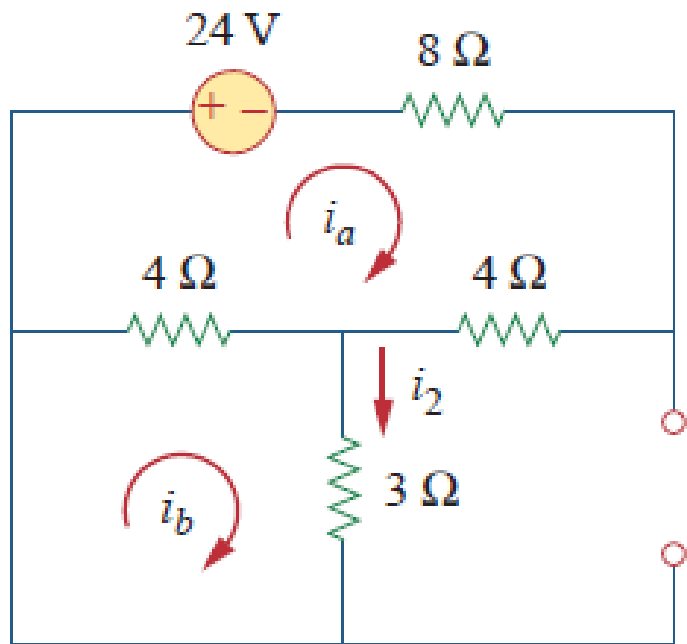
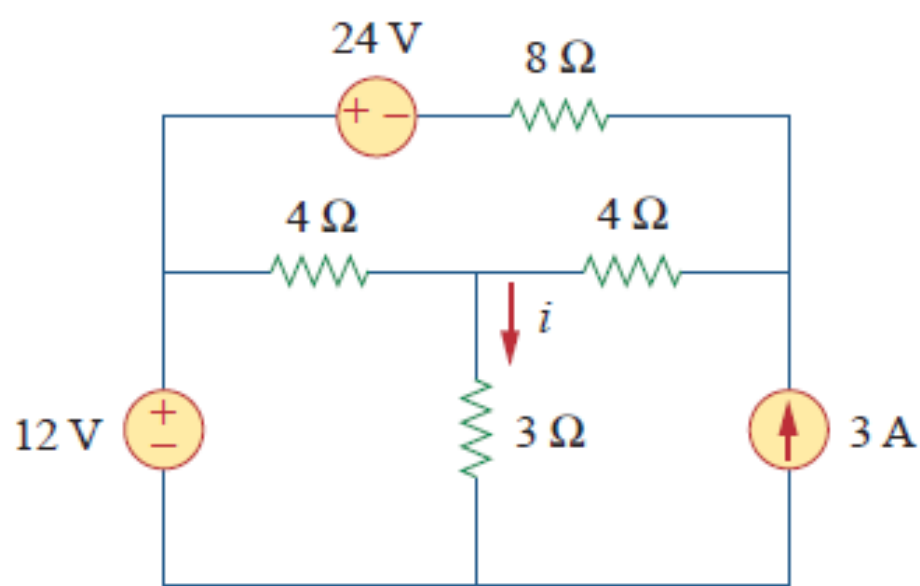
$$i_o = -\frac{8}{17} = -0.4706 \text{ A}$$





$$i_1 = \frac{12}{6} = 2 \text{ A}$$

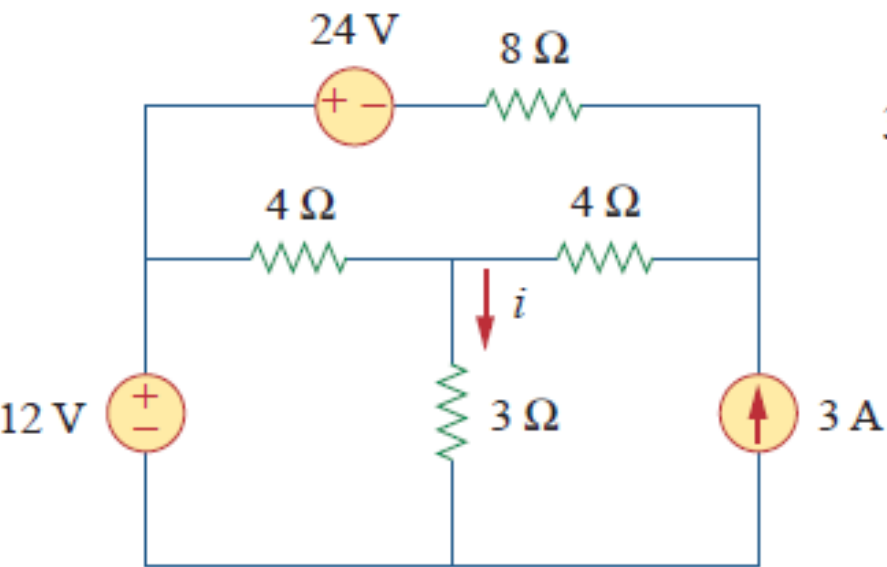




$$16i_a - 4i_b + 24 = 0 \quad \Rightarrow \quad 4i_a - i_b = -6$$

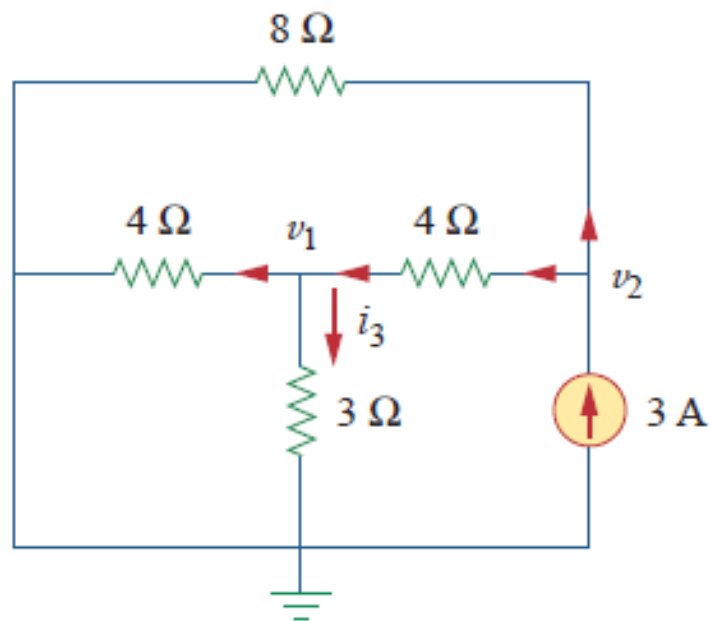
$$7i_b - 4i_a = 0 \quad \Rightarrow \quad i_a = \frac{7}{4}i_b$$

$$i_2 = i_b = -1$$



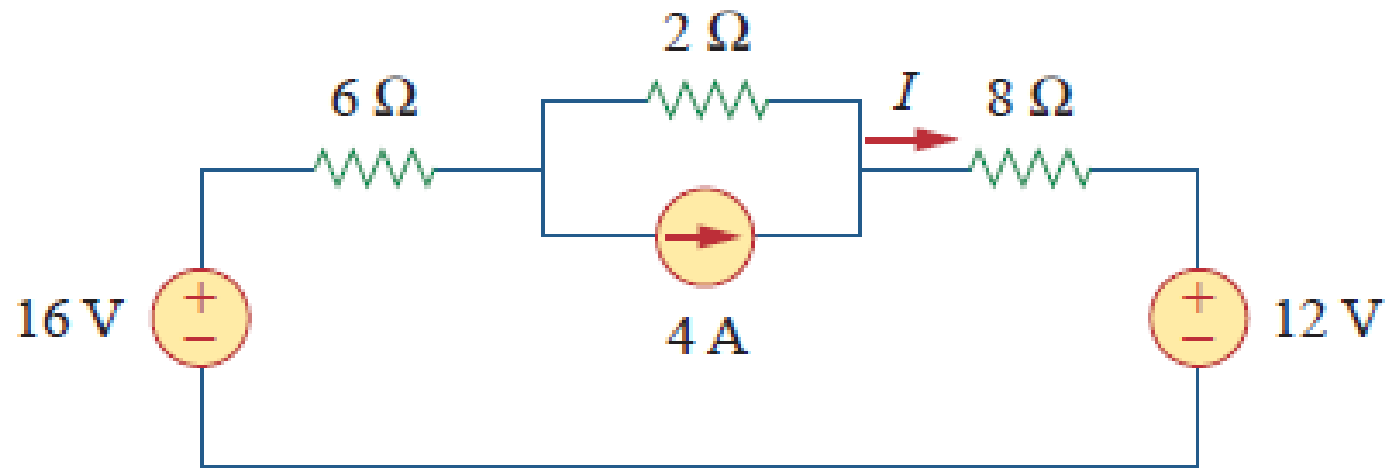
$$3 = \frac{v_2}{8} + \frac{v_2 - v_1}{4} \Rightarrow 24 = 3v_2 - 2v_1$$

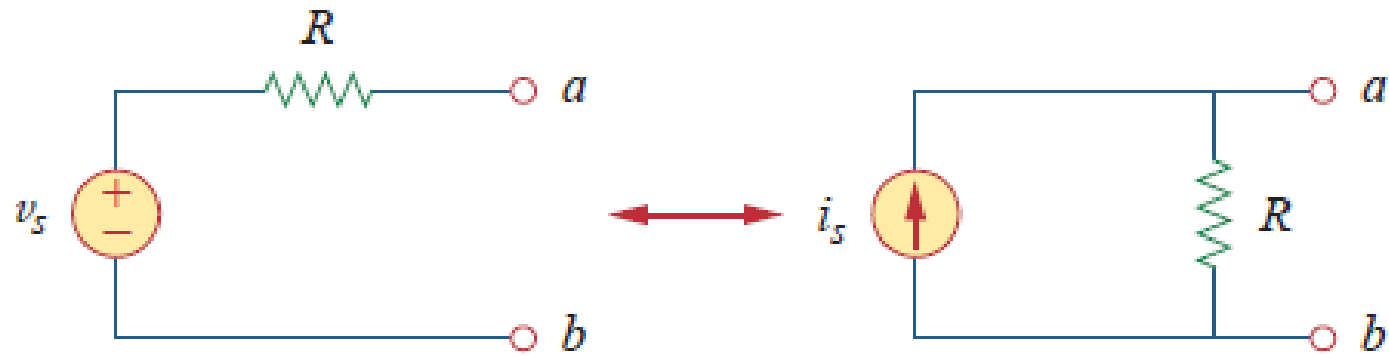
$$\frac{v_2 - v_1}{4} = \frac{v_1}{4} + \frac{v_1}{3} \Rightarrow v_2 = \frac{10}{3}v_1$$



$$i_3 = \frac{v_1}{3} = 1 \text{ A}$$

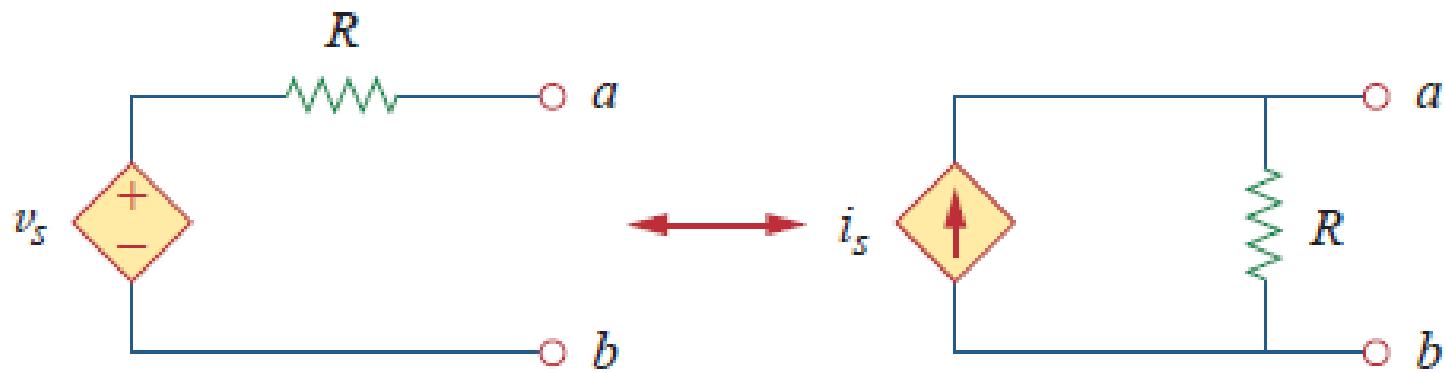
$$i = i_1 + i_2 + i_3 = 2 - 1 + 1 = 2 \text{ A}$$

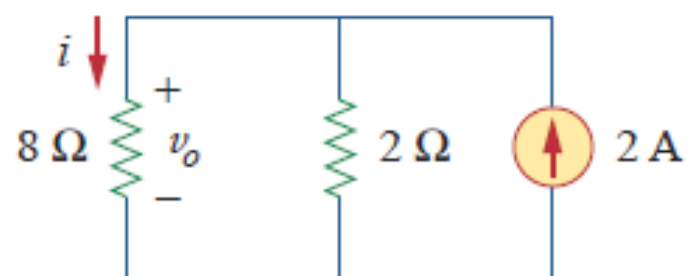
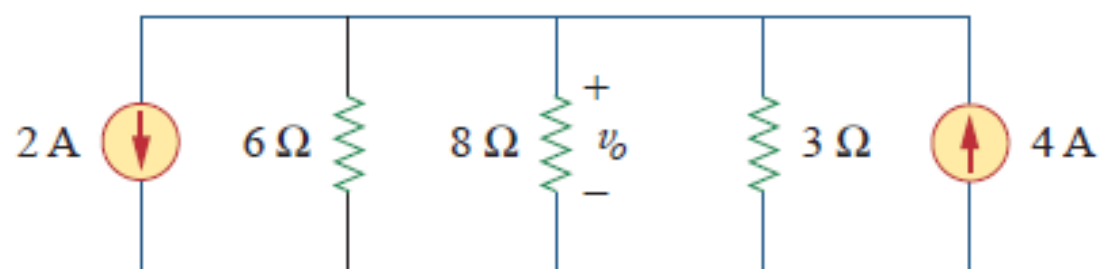
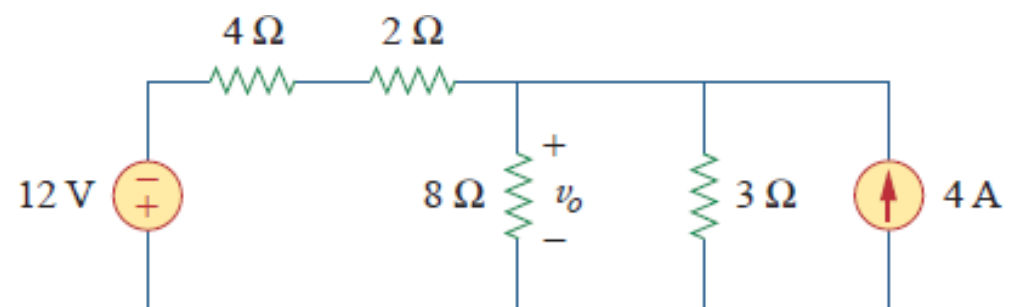
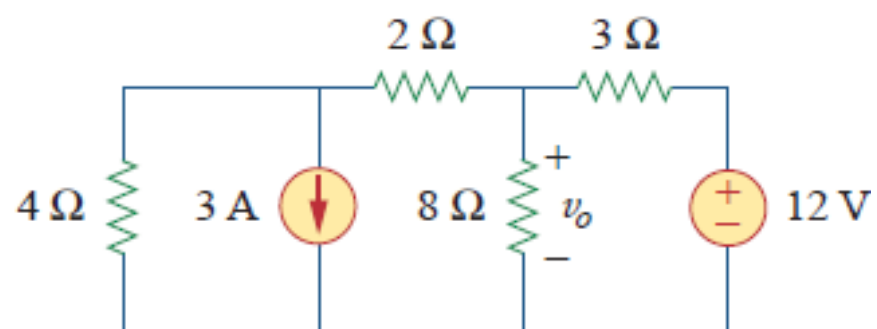




$$v_s = i_s R$$

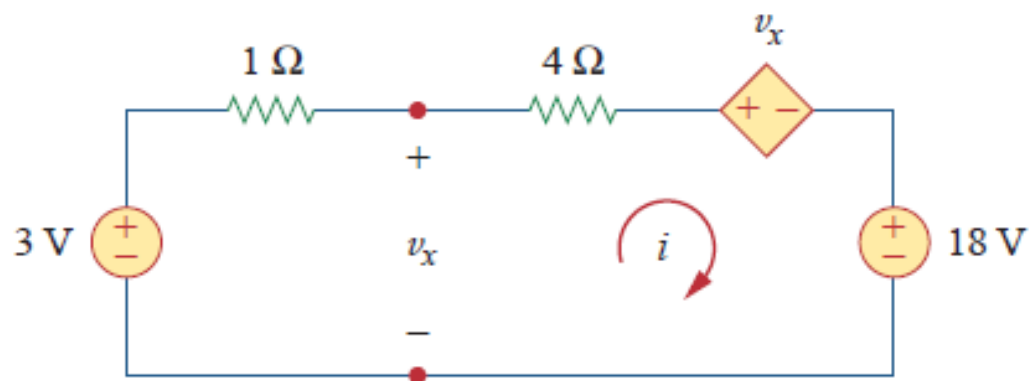
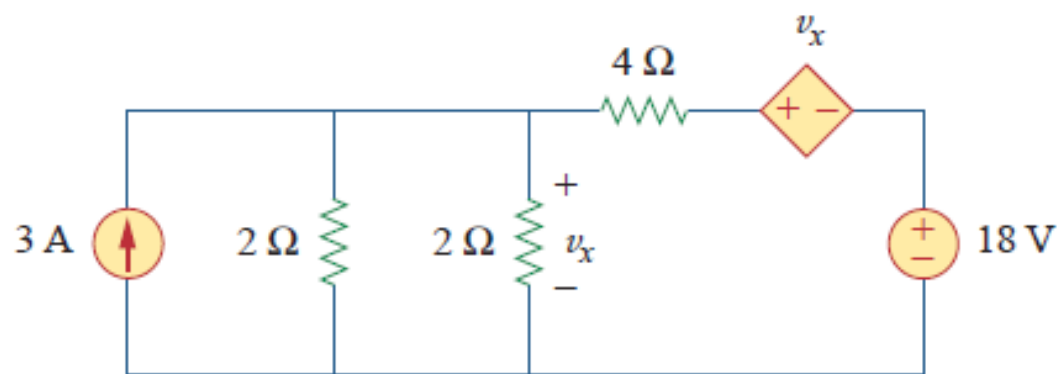
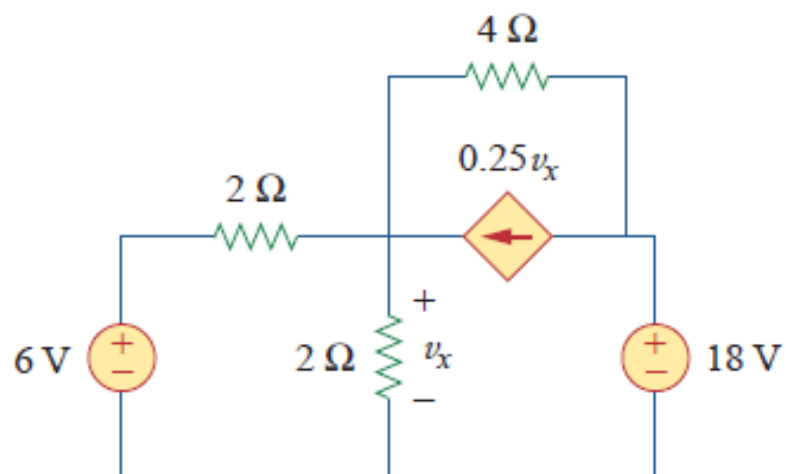
$$i_s = \frac{v_s}{R}$$





$$i = \frac{2}{2 + 8}(2) = 0.4 \text{ A}$$

$$v_o = 8i = 8(0.4) = 3.2 \text{ V}$$



$$-3 + 1i + v_x = 0 \quad \Rightarrow \quad v_x = 3 - i$$

$$v_x = 3 - i = 7.5 \text{ V.}$$

$$15 + 5i + 3 - i = 0 \quad \Rightarrow \quad i = -4.5 \text{ A}$$