Chapter 5, Solution 31.

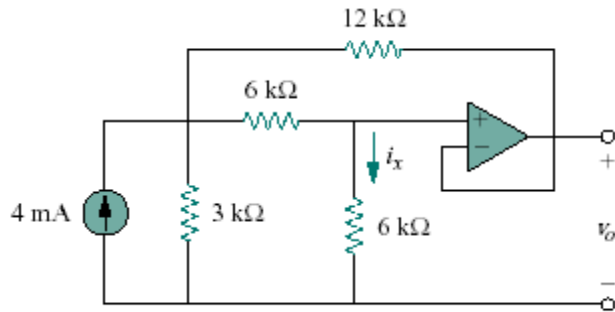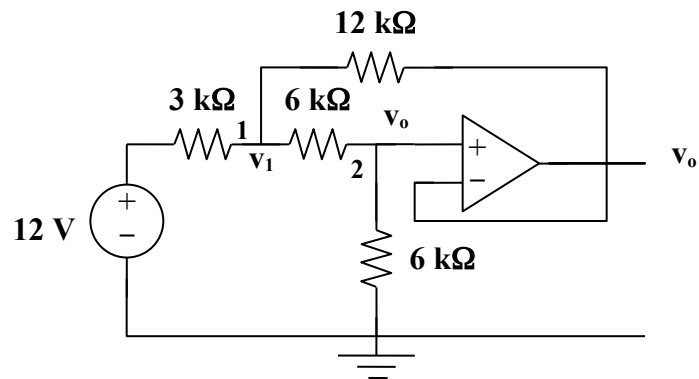For the circuit in Fig. 5.69, find i_x.

Figure 5.69
For Prob. 5.31.

Solution

After converting the current source to a voltage source, the circuit is as shown below:

At node 1,

$$\frac{12 - v_1}{3} = \frac{v_1 - v_o}{6} + \frac{v_1 - v_o}{12} \longrightarrow \quad 48 = 7v_1 - 3v_o \qquad (1)$$

At node 2,

$$\frac{v_1 - v_o}{6} = \frac{v_o - 0}{6} = i_x \longrightarrow \quad v_1 = 2v_o \qquad (2)$$

From (1) and (2),

$$v_o = \frac{48}{11}$$

$$i_x = \frac{v_o}{6k} = \textbf{727.2 } \boldsymbol{\mu}\textbf{A}$$