**Chapter 10, Solution 6.**

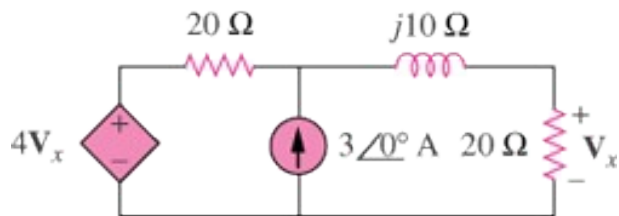Determine $V_x$ shown in Fig. 10.55



Figure 10.55
For Prob. 10.6.

**Solution**

Let $V_o$ be the voltage across the current source. Using nodal analysis, we get:

$$\frac{V_o - 4V_x}{20} - 3 + \frac{V_o}{20 + j10} = 0 \qquad \text{where} \qquad V_x = \frac{20}{20 + j10} V_o$$

Combining these we get:

$$\frac{V_o}{20} - \frac{4V_o}{20 + j10} - 3 + \frac{V_o}{20 + j10} = 0 \rightarrow (1 + j0.5 - 3)V_o = 60 + j30$$

$$V_o = \frac{60 + j30}{-2 + j0.5} \quad \text{or} \quad V_x = \frac{20(3)}{-2 + j0.5} =$$

$$\mathbf{29.11\angle{-166}° \ V}.$$