Chapter 11, Solution 63.

Find $\mathbf{I}_o$ in the circuit of Fig. 11.82.

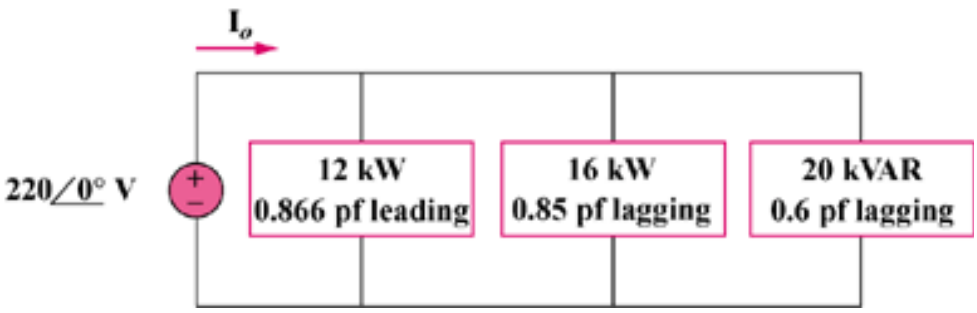

Figure 11.82
For Prob. 11.63.

Solution

Let $\mathbf{S} = \mathbf{S}_1 + \mathbf{S}_2 + \mathbf{S}_3$.

$$\mathbf{S}_1 = 12 - j\frac{12}{0.866}\sin(\cos^{-1}(0.866)) = 12 - j6.929$$

$$\mathbf{S}_2 = 16 + j\frac{16}{0.85}\sin(\cos^{-1}(0.85)) = 16 + j9.916$$

$$\mathbf{S}_3 = \frac{(20)(0.6)}{\sin(\cos^{-1}(0.6))} + j20 = 15 + j20$$

$$\mathbf{S} = 43 + j22.987 = \mathbf{V}\mathbf{I}_o^*$$

$$\mathbf{I}_o^* = \frac{\mathbf{S}}{\mathbf{V}} = \frac{(43 + j22.99)x10^3}{220} = 195.45 + j104.5 = 221.6\angle 28.13°$$

$$\mathbf{I}_o = \mathbf{221.6\angle -28.13° \ A}$$