Chapter 10, Solution 67.

Find the Thevenin and Norton equivalent circuits at terminals *a-b* of the circuit in Fig. 10.110.

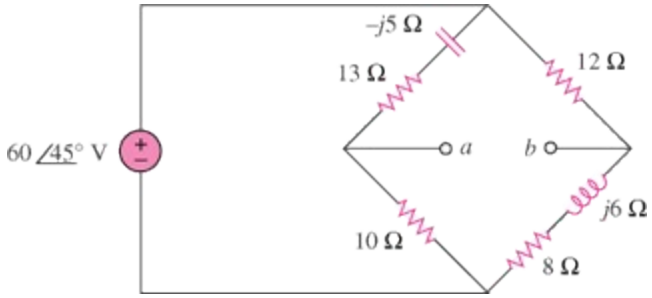

Figure 10.110
For Prob. 10.67.

Solution

$$\boldsymbol{Z_N = Z_{Th} = 10\,//(13 - j5) + 12\,//(8 + j6) = \frac{10(13 - j5)}{23 - j5} + \frac{12(8 + j6)}{20 + j6} = \underline{11.243 + j1.079\Omega}}$$

$$V_a = \frac{10}{23 - j5}(60\angle 45^o) = 13.78 + j21.44, \qquad V_b = \frac{(8 + j6)}{20 + j6}(60\angle 45^o) = 12.069 + j26.08\Omega$$

$$\boldsymbol{V_{Th} = V_a - V_b = \underline{1.711 - j4.64 = 4.945\angle -69.76^o}\ V,}$$

$$\boldsymbol{I_N = \frac{V_{Th}}{Z_{Th}} = \frac{4.945\angle -69.76°}{11.295\angle 5.48°} = \underline{437.8\angle -75.24^o}\ mA}$$

$$\mathbf{VThev = 4.945\angle -69.76^\circ\ V}$$

$$\mathbf{IN = 437.8\angle -75.24^\circ\ mA}$$