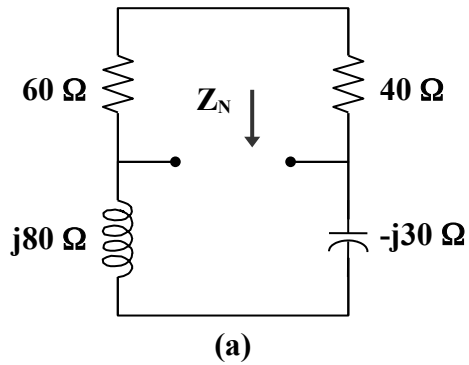**Chapter 10, Solution 64.**
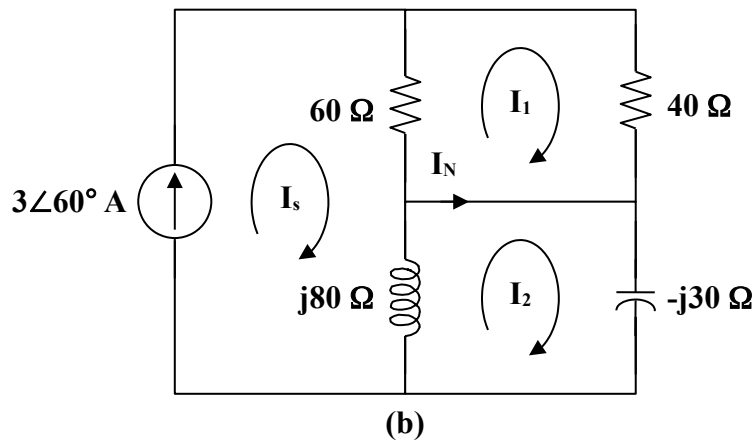
Z_N is obtained from the circuit in Fig. (a).

(a)

$Z_N = (60 + 40) \,||\, (j80 - j30) = 100 \,||\, j50 = \dfrac{(100)(j50)}{100 + j50}$

$Z_N = 20 + j40 = \mathbf{44.72\angle63.43°\ \Omega}$

To find $\mathbf{I}_N$, consider the circuit in Fig. (b).

(b)

$\mathbf{I}_s = 3\angle60°$

For mesh 1,
$$100\,\mathbf{I}_1 - 60\,\mathbf{I}_s = 0$$
$$\mathbf{I}_1 = 1.8\angle60°$$

For mesh 2,
$$(j80 - j30)\,\mathbf{I}_2 - j80\,\mathbf{I}_s = 0$$
$$\mathbf{I}_2 = 4.8\angle60°$$

$I_N = I_2 - I_1 = \mathbf{3\angle60°\ A}$