Chapter 9, Solution 54.

In the circuit of Fig. 9.61, find $\mathbf{V}_s$ if $\mathbf{I}_o = 2\angle 0°$ A.

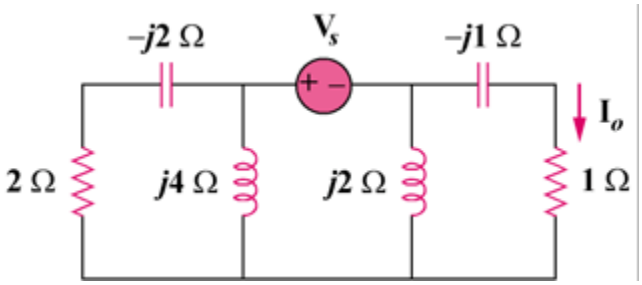
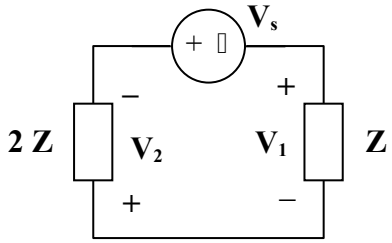


Figure 9.61
For Prob. 9.54.

Solution

Since the left portion of the circuit is twice as large as the right portion, the equivalent circuit is shown below.



$$\mathbf{V}_1 = \mathbf{I}_o(1-j) = 2(1-j)$$
$$\mathbf{V}_2 = 2\mathbf{V}_1 = 4(1-j)$$
$$\mathbf{V}_2 + \mathbf{V}_s + \mathbf{V}_1 = 0 \text{ or}$$
$$\mathbf{V}_s = -\mathbf{V}_1 - \mathbf{V}_2 = -6(1-j) = (6\angle 180°)(1.4142\angle -45°)$$

$$\mathbf{V}_s = \mathbf{8.485\angle 135°\ V}$$