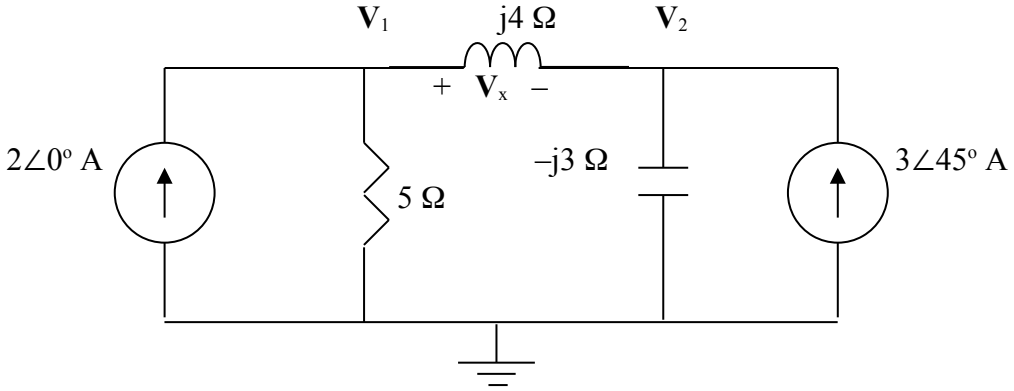
Chapter 10, Solution 16.

Consider the circuit as shown in the figure below.



At node 1,

$$-2 + \frac{V_1 - 0}{5} + \frac{V_1 - V_2}{j4} = 0$$
$$(0.2 - j0.25)V_1 + j0.25V_2 = 2 \qquad (1)$$

At node 2,

$$\frac{V_2 - V_1}{j4} + \frac{V_2 - 0}{-j3} - 3\angle 45^\circ = 0$$
$$j0.25V_1 + j0.08333V_2 = 2.121 + j2.121 \qquad (2)$$

In matrix form, (1) and (2) become

$$\begin{bmatrix} 0.2 - j0.25 & j0.25 \\ j0.25 & j0.08333 \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \end{bmatrix} = \begin{bmatrix} 2 \\ 2.121 + j2.121 \end{bmatrix}$$

Solving this using MATLAB, we get,

```
>> Y=[(0.2-0.25i),0.25i;0.25i,0.08333i]

Y =

  0.2000 - 0.2500i        0 + 0.2500i
      0 + 0.2500i        0 + 0.0833i

>> I=[2;(2.121+2.121i)]

I =
```

```
   2.0000
   2.1210 + 2.1210i

>> V=inv(Y)*I

V =

   5.2793 - 5.4190i
   9.6145 - 9.1955i
```

$$V_s = V_1 - V_2 = -4.335 + j3.776 = \mathbf{5.749\angle 138.94^\circ\ V}.$$