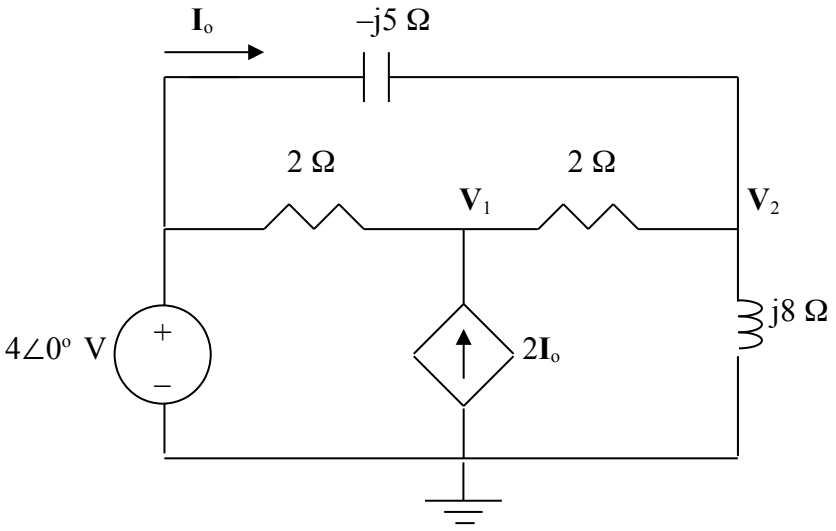
Chapter 10, Solution 11.

Consider the circuit as shown below.



At node 1,

$$\frac{V_1 - 4}{2} - 2I_o + \frac{V_1 - V_2}{2} = 0$$
$$V_1 - 0.5V_2 - 2I_o = 2$$

But, $I_o = (4–V_2)/(–j5) = –j0.2V_2 + j0.8$

Now the first node equation becomes,

$$V_1 – 0.5V_2 + j0.4V_2 – j1.6 = 2 \text{ or}$$
$$V_1 + (–0.5+j0.4)V_2 = 2 + j1.6$$

At node 2,

$$\frac{V_2 - V_1}{2} + \frac{V_2 - 4}{-j5} + \frac{V_2 - 0}{j8} = 0$$
$$–0.5V_1 + (0.5 + j0.075)V_2 = j0.8$$

Using MATLAB to solve this, we get,

```
>> Y=[1,(-0.5+0.4i);-0.5,(0.5+0.075i)]

Y =

   1.0000            -0.5000 + 0.4000i
```

```
  -0.5000            0.5000 + 0.0750i

>> I=[(2+1.6i);0.8i]

I =

   2.0000 + 1.6000i
        0 + 0.8000i

>> V=inv(Y)*I

V =

   4.8597 + 0.0543i
   4.9955 + 0.9050i
```

$I_o = -j0.2V_2 + j0.8 = -j0.9992 + 0.01086 + j0.8 = 0.01086 - j0.1992$

$= \mathbf{199.5\angle 86.89^\circ\ mA}$.