Chapter 9, Solution 51.

If the voltage v_o across the 2-Ω resistor in the circuit of Fig. 9.58 is 10 cos(2t) V, obtain i_s.

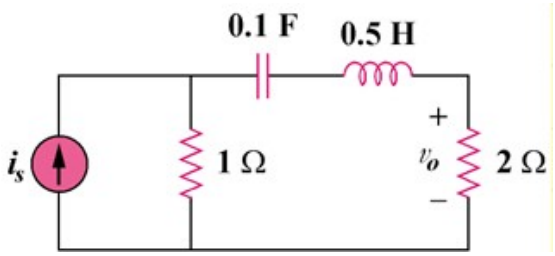

Figure 9.58
For Prob. 9.51.

Solution

$$0.1\text{ F} \longrightarrow \frac{1}{j\omega C} = \frac{1}{j(2)(0.1)} = -j5$$

$$0.5\text{ H} \longrightarrow j\omega L = j(2)(0.5) = j$$

The current **I** through the 2-Ω resistor is

$$\mathbf{I} = \frac{1}{1 - j5 + j + 2}\mathbf{I}_s = \frac{\mathbf{I}_s}{3 - j4},$$

where $\mathbf{I} = \frac{10}{2}\angle 0° = 5$

$$\mathbf{I}_s = (5)(3 - j4) = 25\angle -53.13°$$

Therefore,

$$i_s(t) = \mathbf{25\cos(2t - 53.13°)\ A}$$