

Chapter 9, Solution 41.

Find $v(t)$ in the RLC circuit of Fig. 9.48.

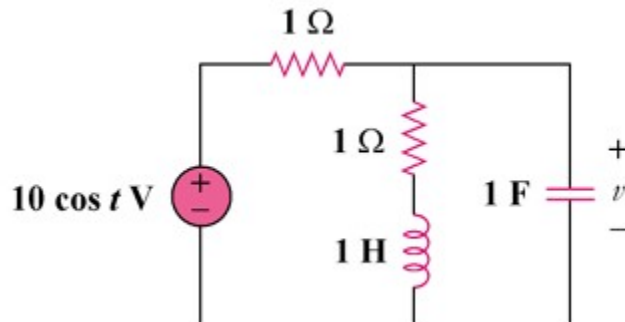


Figure 9.48
For Prob. 9.41.

Solution

$$\omega = 1,$$

$$1 \text{ H} \longrightarrow j\omega L = j(1)(1) = j$$

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

$$\mathbf{Z} = 1 + (1 + j) \parallel (-j) = 1 + \frac{-j + 1}{1} = 2 - j$$

$$\mathbf{I} = \frac{\mathbf{V}_s}{\mathbf{Z}} = \frac{10}{2 - j}, \quad \mathbf{I}_c = (1 + j)\mathbf{I}$$

$$\mathbf{V} = (-j)(1 + j)\mathbf{I} = (1 - j)\mathbf{I} = \frac{(1 - j)(10)}{2 - j} = 6.325 \angle -18.43^\circ$$

Thus,

$$v(t) = 6.325 \cos(t - 18.43^\circ) \text{ V}$$