Chapter 11, Solution 66.

Obtain the average power absorbed by the 6-kΩ resistor in the op amp circuit in Fig. 11.85.

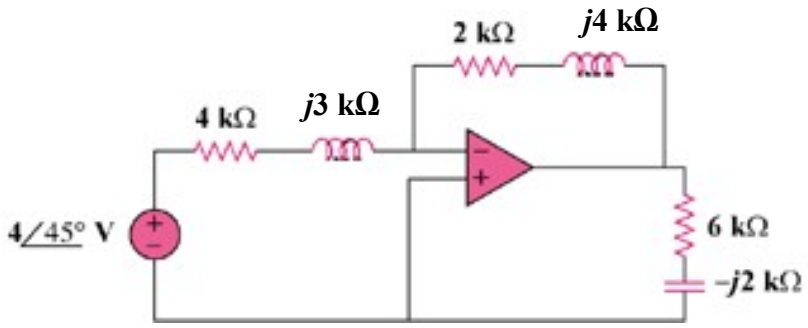

Figure 11.85
For Prob. 11.66.

Solution

As an inverter,

$$\mathbf{V}_o = \frac{-\mathbf{Z}_f}{\mathbf{Z}_i}\mathbf{V}_s = \frac{-(2+j4)}{4+j3}\cdot(4\angle 45°)$$

$$\mathbf{I}_o = \frac{\mathbf{V}_o}{6-j2}\text{ mA} = \frac{-(2+j4)(4\angle 45°)}{(6-j2)(4+j3)}\text{ mA}$$

The power absorbed by the 6-kΩ resistor is

$$P = |\mathbf{I}_o|^2 R = \left(\frac{\sqrt{20}\times 4}{\sqrt{40}\times 5}\right)^2 \times 10^{-6} \times 6\times 10^3$$

$$P = \mathbf{1.92\ mW}$$