

### Chapter 11, Solution 9.

For the op amp circuit in Fig. 11.41,  $V_s = 10\angle 30^\circ$  V. Find the average power absorbed by the 20-k $\Omega$  resistor.

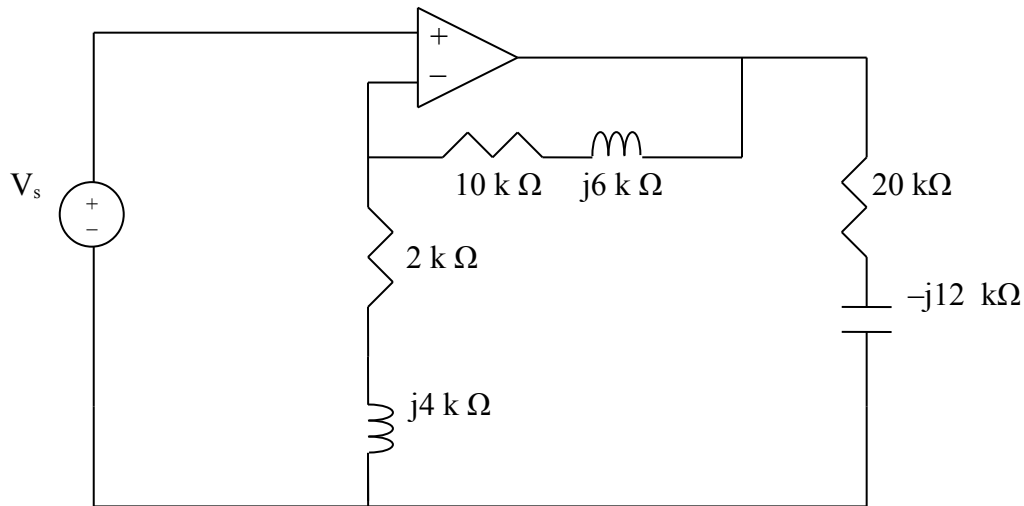


Figure 11.41  
For Prob. 11.9.

### Solution

This is a non-inverting op amp circuit. At the output of the op amp,

$$V_o = \left(1 + \frac{Z_2}{Z_1}\right) V_s = \left(1 + \frac{(10 + j6) \times 10^3}{(2 + j4) \times 10^3}\right) (8.66 + j5) = 20.712 + j28.124$$

The current through the 20-k $\Omega$  resistor is

$$I_o = \frac{V_o}{20k - j12k} = 0.1411 + j1.491 \text{ mA} \quad \text{or } |I_o| = 1.4975 \text{ A}$$

$$P = [|I_o|^2/2]R = [1.4875^2/2]10^{-6} \times 20 \times 10^3$$

$$= 22.42 \text{ mW}$$