

**1.28** A 150-W incandescent outdoor lamp is connected to a 120-V source and is left burning continuously for an average of 12 hours per day. Determine:

- (a) the current through the lamp when it is lit.  
 (b) the cost of operating the light for one non-leap year if electricity costs 9.5 cents per kWh.

a) Per (1.7)  $p = vi \Rightarrow i = \frac{p}{v} = \frac{150}{120}$

$$\underline{\underline{i = 1.25 A}}$$

b) Total energy used in one year =  $W_{\text{year}} = \int_0^{1\text{yr}/2} p dt = \int_0^{1\text{yr}/2} 150\text{W} dt$

$$W_{\text{year}} = 150\text{W} \left( \frac{1\text{yr} - 0}{2} \right) \left( \frac{365\text{ days}}{\text{yr}} \right) \left( \frac{24\text{ hrs}}{\text{day}} \right) \left( \frac{1\text{ kW}}{1000\text{ W}} \right)$$

$$= 657 \text{ kW}\cdot\text{hr}$$

$$\text{Cost} = (657 \text{ kW}\cdot\text{hr}) \left( \frac{\$0.095}{\text{kWh}} \right)$$

$$= \$62.415 \quad \text{round-up}$$

$$\underline{\underline{\text{Cost} = \$62.42}}$$