General Physics 2 | 4th Quarter
WW3: Alternating Current
March 21 2022

1. An rms current of $8\ A$ flows through a $14\ \Omega$ resistor.
   a. Calculate the average power absorbed by the resistor.

      $\bar{P} = V_{rms} I_{rms} = 112\ V\ \cdot 8\ A$
      $\bar{P} = 896\ W\ \approx 900\ W$

   b. Calculate the peak voltage.

      $V = IR = 8\ A \cdot 14\ \Omega$
      $V_{rms} = 112V$

      $V_o = \sqrt{2} \cdot V_{\text{rms}} = \sqrt{2} \cdot 112\ V$
      $V_o = 158.4\ V\ \approx 160\ V$

2. A $180\ W$ is connected to a $240\ V$ AC line.
   a. Calculate the rms current flowing from the outlet.

      $I_{rms} = \dfrac{\bar{P}}{V_{rms}} = \dfrac{180W}{240V}$
      $I_{rms} = 0.75A$

   b. Determine the peak current.

      $I_o = \sqrt{2} \cdot I_{rms} = \sqrt{2} \cdot 0.75A$
      $I_o = 1.06A$

   c. Calculate the peak voltage.

      $V_o = \sqrt{2} \cdot V_{rms} = \sqrt{2} \cdot 240V$
      $V_o = 339.41\ V\ \approx 340\ \text{V}$

   d. Calculate the maximum power delivered in the AC line.

      $P_{max} = V_o I_o = (339.41V)(1.06A)$
      $P_{max} = 359.78\ W\ \approx 360\ W$