PHY121 Summer 2018
Problem Set #8
Due Monday 6/18

1. A wave is described by $y = 0.0210 \sin(kx - \omega t)$, where k = 2.1 rad/m, ω = 3.64 rad/s, x and y are in meters, and t is in seconds. Determine:

   (a) The amplitude of the wave.

   (b) The wavelength of the wave.

   (c) The frequency of the wave.

   (d) The speed of the wave.

2. A point source emits 30 W of sound isotropically. A small microphone intercepts the sound in an area of 0.75 cm^2, 200 m from the source. Calculate:

   (a) The intensity at the microphone.

   (b) The sound level (in dB) at the microphone.

   (c) The power intercepted by the microphone.

3. To the nearest second, how many seconds elapse between when a flash of lightning is seen and when the clap of thunder is heard if the lightning is:

   (a) 1 km away?

   (b) 1 mi away?

4. Two loud speakers are located 3.35 m apart on an outdoor stage. A listener is 18.3 m from one and 19.5 m from the other. During the sound check, a signal generator drives the two speakers in phase with the same amplitude and frequency, which is swept through the audible range from 20 Hz to 20 kHz.

   (a) What is the lowest frequency that gives destructive interference (minimum sound) at the listener's location?

   (b) What is the lowest frequency that gives constructive interference (maximum sound) at the listener's location?

   (c) How can you easily determine the remaining frequencies for each of these conditions?

5. A violin string 30 cm long with linear density 0.65 g/m is placed near a loudspeaker that is fed by an audio oscillator of variable frequency. When the speaker is swept through frequencies from 500 - 1500 Hz, the string resonates only at 880 and 1320 Hz. What is the tension in the string?