Chapter 16 Written Homework Problems
DUE: April 28th at the beginning of class
SHOW ALL WORK FOR FULL CREDIT

1. The average human can hear sound in a range of roughly 20 Hz to 20,000 Hz. What is the range of wavelengths covered by human hearing? Bats use echolocation to navigate and detect prey. Typically the minimum wavelength a bat can emit is about 3.3 mm. What is the corresponding frequency?

2. You drop a rock into a well and hear the splash a time *t* later. *(a)* What is the well's depth *D*? *(b)* It *t* = 5 s, what is the difference in depth between assuming the speed of sound is infinite and finite at 343 ms/?

3. A jet plane flies at an altitude of 6000 ft at Mach 2.0 and passes directly overhead. How far has the plane traveled by the time you hear the sonic boom?

4. *(a)* What is the ratio of the intensity of a loader sound to a softer sound if the sounds differ by 10 dB? *(b)* If a sound is 100 times as intense as another, what is the difference in their sound intensity level in dB? *(c)* How about if one sound is twice as intense as another?

5. A freight train engineer sits in a stationary locomotive as another freight train approaches on parallel tracks. The engineer in the stationary locomotive blows his horn which has a frequency of 350 Hz. The engineer in the approaching locomotive then blows his identical horn and the engineer in the stationary locomotive hears a beat frequency of 30 Hz. At what speed is the moving locomotive approaching the stationary locomotive?

6. The spring I used in class to produce longitudinal waves had a mass of 0.2 kg, a spring constant of 1.2 N/m and length of 3 m. What was the speed of the longitudinal waves?