

Music 170 Homework problem set 3 (due Oct. 16)

1. A mass-on-a-spring (the simplest kind, with one mass on one end of a spring that is anchored (fixed) at the other end) vibrates at 100 Hz. The spring is 10 cm long. How much shorter should we cut the spring to increase the frequency to 200 Hz.?
2. Light travels at $3 \cdot 10^8$ meters/second. A particular shade of red light has a wavelength of 700 nanometers ($7 \cdot 10^{-7}$ meters.) What is its frequency? Would a sound at this frequency be audible?
3. A 440 Hz. sinusoidal tone and another, different sinusoidal tone, beat together ten times per second. What are the possible frequencies of the second tone?
4. If you blow across the end of a one-meter-long pipe, open at both ends, what is the lowest frequency that you can produce? (Assume the speed of sound is 343 meters per second; ignore non-ideal behavior such as “end corrections”).
5. To produce the same frequency with a pipe that is closed at one end, what length should the pipe be?