Homework #5

Question 1   What is a standing wave?

Question 2

   a) Sketch the velocity and pressure mode structure of the first two modes of a "closed tube".
       Label the nodes.
   b) If the tube has length 1 meter and the speed of sound is 340 m/s, what are the frequencies of
       these two modes?
   c) A register key is a tone hole (a hole in the tube) that is placed at the pressure node location of
       the second node. Indicate this point on your sketch.

Question 3

What are the mode frequencies of the first four modes of a string that has length 1 meter, mass density
.01 kg/m, and tension of 100 N?

Question 4

Why does the pitch of a brass instrument rise when it warms-up?

Question 5

If the wavelength of a tone at 440 Hz in air is 0.77m, what is the air temperature in centigrade? Hint
look at the notes on the Friday #3 worksheet.

Question 6   (three parts)

A string of length 1m, mass density .005 kg/m, and Tension 200 N has a fundamental frequency of 100
Hz. Specifically, what **three** different ways could you change the fundamental frequency to 50 Hz? (For
example, if you say "change the length", then state what length it would take to change the pitch to 50
Hz).