Physics 200 (Stapleton) Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Practice – 16.10 & 17.5 Superposition, Interference and Resonance

1. A “showy” custom-built car has two brass horns that are supposed to produce the same frequency but actually emit 263.8 and 264.5 Hz. What beat frequency is produced?

2. A piano tuner hears a beat every 2.00 s when listening to a 264.0-Hz tuning fork and a single piano string. What are the two possible frequencies of the string?

3. Another type of tube is one that is open at both ends. Examples are some organ pipes, flutes, and oboes. The resonances of tubes open at both ends can be analyzed in a very similar fashion to those for tubes closed at one end. The air columns in tubes open at both ends have maximum air displacements at both ends. A standing wave occurs at resonance.

A. What is the fundamental frequency of a 0.672-m-long tube, open at both ends, on a day when the speed of sound is 344 m/s?

B. What is the frequency of its second harmonic?

4. How long must an open-pipe (at both ends) instrument be in order to have a fundamental frequency of 262 Hz (this frequency corresponds to middle C on the evenly tempered chromatic scale) on a day when air temperature is 20.0ºC?

5. A. Find the length of an organ pipe closed at one end that produces a fundamental frequency of 256 Hz when air temperature is 18.0ºC.

 B. What is its fundamental frequency at 25.0ºC?

**Solutions**:

1. 0.7 Hz 2. 263.5 Hz, 264.5 Hz 3. A. 256 Hz B. 512 Hz 4. 0.655 m

5. A. 0.334 m B. 259 Hz