Assignment VII, PHYS 150 (Physics of Sound and Music) Loudness and introduction to Pitch Due Friday, February 21st, 2014

By the time you get this, we'll probably be pretty much done with Chapter 6 of your text and may have even started talking about chapter 7 content. To complete this homework, you may have to read ahead a bit into chapter 7; the topics discussed here will likely be discussed in class soon, but the questions can be answered by reading the first half (p. 121-135) of chapter 7 of your text carefully.

Chapter 6 Questions

- 1. If you assume that the average listener can just make out a loudness difference of 2.5 dB in sound level, how many dynamic levels does can one realistically expect an (average) flute soloist to distinguish? (Use Clark and Luce 1965 data from your text). Justify your answer with an explanation and calculation if necessary.
- 2. Two sounds are heard by the same listener. Sound 1 had a loudness level of 40 sones. Sound 2 had a loudness level of 60 sones. If the listener has an "average" perception of sound, how would the listener rate the ratio $\left(\frac{\text{loudness of sound 2}}{\text{loudness of sound 1}}\right)$?
- 3. Two sounds are heard by the same listener. Sound 1 had a loudness level of 80 phons. Sound 2 had a loudness level of 90 phons. If the listener has an "average" perception of sound, how would the listener rate the ratio $\left(\frac{\text{loudness of sound 2}}{\text{loudness of sound 1}}\right)$?
- 4. Briefly describe the phenomena called "masking".

Chapter 7 Questions

- 5. If you had a 72 cm string clamped on both ends and wanted to place your finger somewhere between the two ends so that plucking one side would give you a note exactly an octave above the other side, where would you put your finger? (Explain your answer clearly or include a picture to help convey your answer).
- 6. What does jnd stand for?
- 7. Find the jnd at frequencies of 100 Hz and 10 kHz.
- 8. Which of the four theories discussed by Ward (1963) about absolute pitch do you find most compelling? Explain why.
- 9. Why does your textbook suggest that the general tendency to raise the pitch standard that has dominated over the last few hundred years is unfortunate?