

Music 170 Homework problem set 5 (due Oct. 27)

(Note: there is no new formula sheet this week; we're still using last week's.)

1. Two periodic tones (with fundamental and overtones present) are played at 300 Hz and 430 Hz respectively. Where are the first two partials within a minor third of each other? Within 50 Hz?
2. Two trumpets play the interval of a tritone (a ratio of 1.414 to 1). Two clarinets play the same interval. (Assume the trumpet sounds include all partials but clarinets only make odd ones). Which would sound more dissonant, the two trumpets or the two clarinets? Why?
3. A series of Helmholtz resonators are arranged to make a musical scale that covers two octaves. Assume that only the volumes are different (i.e., that length and area are the same for all the resonators.) How much larger must the largest volume be than the smallest (as a ratio)?
4. A major chord is played at frequencies of 300, 400, and 500 Hz. What is the lowest frequency at which partials of all three coincide?
5. A particular piano note has two strings tuned almost to the same pitch, but detuned by $1/6$ Hz. Suppose all the partials of both strings are present and in phase with each other at the beginning of the note. Which partials should be present after 1 second? After 3 seconds?