

Music 170 Homework problem set 5 (due Oct. 30)

1. A complex tone (not necessarily periodic) has components at 220, 440, 500, 660, 880, 1000, and 1100 Hz. What fundamental frequencies would a listener hear?
2. Two periodic tones (with fundamental and overtones present) are played at 300 Hz and 430 Hz respectively. At what frequencies are the first two partials within a ratio of 1.2 of each other? (This is very approximately a critical band.) At what frequencies are there two partials that would beat audibly (i.e., they are tuned within 20 Hz. of each other)?
3. A major chord is played, whose three notes have fundamental frequencies of 300, 400, and 500 Hz. What is the lowest frequency at which partials of all three coincide?
4. 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 initially in phase with each other at the beginning of the note. Which partials should be present after 1 second? After 3 seconds?
5. Two sinusoids have equal amplitudes, equal frequencies, and their phase differs by 90 degrees ($\pi/2$ radians). By how many dB is their sum louder than either of the original ones?