Spring 2001
Review for Exam 2

To prepare for this exam it is a good idea to review the homework assigned since the last exam and to review the problems presented in the lab sections.

1. Know how to combine sound intensities from independent sources when all sources have the **same** intensity and when the sources have **different** intensities.
2. Know the definition of an octave and how to calculate octave relationships.
3. What is the difference between an oscilloscope and a spectrum analyzer?
4. What is a scale?
5. What is an interval?
6. What is a whole tone? Half tone?
7. Know how to display the different types of signals we have studied (for example sine waves, sawtooth waves, square waves, triangle waves, pulse trains, white noise, single pulses) in terms of their time waveforms and their spectra.
8. What harmonics are present in a sawtooth wave? Triangle wave? Square Wave?
9. What is the difference between a periodic and an aperiodic signal? Of the signals listed in #7 which are periodic and which are aperiodic?
10. Know the definition of each of the signal types listed in #7. For example, you should know that a sawtooth wave is a complex periodic wave, has energy at odd and even integer multiples of f_O, has a spectral envelope slope of –6 dB/octave, and the dB level of a given harmonic is determined by $dB = -20 \log h_i$.
11. Know how to calculate the level of a harmonic, given the fundamental (1^{st} harmonic) or a different harmonic number. $dB=20\log 1/h$ and $dB=20\log 1/h^2$
12. Know how to draw an amplitude spectrum with a specified number of harmonics
13. Know how to draw a spectrum of a complex wave after it has been passed through a filter.

14. Know how to calculate signal-to-noise ratio.
15. Know the 3 broad categories of musical instruments.
16. What is meant by attack, steady state, and decay? How do these vary for different families of musical instruments. For example, how do a woodwind and a percussion instrument differ?
17. Know what is meant by dynamic range, uncertainty, choral effects in music.
18. What is a transducer? Name two kinds of transducers.
19 What is the piezoelectric effect?
20. What is the capacitive effect?
21 What is the electromagnetic effect?
22. What is the dynamic range of a speaker or a microphone?
23. What are the three types of microphones discussed in class and what type of effect do they use (Piezoelectric, Electromagnetic, or Capacitive)?
24. Know the filter types we discussed in class and in lab: Low-pass, high-pass, band pass, band reject, constant bandwidth filter, and constant percentage bandwidth filter.
25. Be able to label/calculate f_c, f_u, f_L bandwidth and attenuation rate.
26. Be able to draw a filter if you are given attenuation rate, f_u, f_L, f_C, etc.

26. Know how to calculate Lps.
27. Know how to calculate SPL given Lps and different filters and filter characteristics.
28. What are the three types of distortion and what is the definition of each?
29. What is the dynamic range of a system?
30. If the rise or decay time of a sinusoidal signal is very short, an audible clicking sound may be heard. This is an example of what type of distortion? Why does this happen?
31. Peak clipping is an example of what type of distortion?
32. Harmonic distortion is an example of what type of distortion?
33. What is the difference between harmonic distortion and intermodulation distortion?
34. A. Draw the spectrum of a sawtooth wave with a period of 10 ms. Use 3 spectral components where the fundamental has an amplitude of 2×10^{-4} w/m^2. Label the levels of all the components in dB IL. B. Now, filter the sawtooth wave with a high pass filter with a cut-off frequency of 200 Hz. The slope of the filter's skirt is 6 dB/octave. What is the spectum of the sawtooth wave after it has been filtered?