Music 170 Homework problem set 8 (due Nov. 17)

1. A professor is speaking 1 meter away from you. You move to a seat 4 meters away. By how many decibels does the level of the direct sound decrease?

2. A room is in the shape of a cube, 10 meters on a side. The wall absorption coefficient is 0.5. What is the predicted reverberation time (RT60)?

3. Suppose a room has an RT60 of 2 seconds at low frequency and 1 second at a high frequency (say 5000 Hz). If a short sound is made in the room, how much more are the high frequencies attenuated than the low ones after one second?

4. A person is standing 4 meters in front of you playing a clarinet. There is a wall 2 meters behind you (so that a line connecting the clarinet player's location to yours would be perpendicular to the wall.) Assuming the wall is flat and reflects sound perfectly, how does the level (in decibels) of the reflection compare to that of the direct sound? How much later does the reflected sound arrive? (Assume sound travels at 343 M/sec).

5. Suppose a performance of Beethoven's ninth symphony lasts 70 minutes. You want to record this at a professional-sounding 144 dB signal-to-noise ratio, you want to capture all frequencies up to 25,000 Hz., and you are recording 16 channels. How many bits of storage will this take? How many gigabytes is that?