Music 192A Homework 3

1. Considering the Nyquist theorem, what is the minimum sample rate necessary to guarantee the following signals be completely reconstructed:
    A. Signal with components up to 20 kHz
    B. Signal with components up to 5 kHz
    C. Signal with components up to 24 kHz

2. What is the highest frequency that may be accurately represented by sampling at the following common sample rates:
    A. 8 kHz
    B. 22.05 kHz
    C. 32 kHz
    D. 44.1 kHz
    E. 48 kHz
    F. 96 kHz
    G. 192 kHz

3. What is the maximum dynamic range that can be encoded by words of the following number of bits:
    A. 8 bits
    B. 12 bits
    C. 16 bits
    D. 20 bits
    E. 24 bits

4. What is the minimum number of bits necessary to fully encode the following dynamic ranges:
    A. 48 dB
    B. 60 dB
    C. 72 dB
    D. 90 dB

5. How long can we record a stereo signal at 16 bit resolution and 44.1 kHz sample rate in the following amount of disk space (1 Mbyte=1024 kbyte, 1 kbyte=1024 bytes):
    A. 512 kbyte
    B. 1 Mbyte
    C. 10 Mbyte
    D. 500 Mbyte

6. Compare the amount of disk space necessary to record a 3 minute, 24 track song in two different ProTools sample formats:
    A. 16 bit/48 kHz
    B. 24 bit/192 kHz