MP211
Principles of Audio Technology I

Signal Flow Calculations

4/6/10
MP211 Signal Flow Calculations

SHOW ALL WORK – no credit for incomplete answers.

1. The input to an audio amplifier is known to be 2.5 Watts, and the output is 25 Watts. What is the gain of the amplifier in dB?

2. The output of an amplifier is half the power of the input. Express the output in dB, relative to the input.

3. How much voltage would appear at the output of a compressor indicating 7 dB gain reduction, if the input was 1.22 volts?
4. An audio signal passes through two devices, each doubling its input voltage. What is the gain of the entire system, in dB?

5. Two audio devices are placed in series such that:
   \[ G_1 = 20 \log \frac{V_{out}}{V_{in}}, \quad G_1 = \text{gain of device one} \]
   \[ G_2 = 20 \log \frac{V_{out}}{V_{in}}, \quad G_2 = \text{gain of device two} \]

   Show that \( G_3 = G_1 + G_2 \), where \( G_3 \) = gain of device one and device two in series.
   (Hint: use the rule for expressing the log of a product as the sum of two logs.)

6. In acoustics, the threshold of pain is approximately 120 dB SPL. How much pressure is this, in Pascals? Tip: You will need to search for the threshold of audibility or hearing.
7. In a lab exercise, you measure a 0.13 volt RMS signal. How would you express this quantity in dBu? dBV?

8. Express -4 dBu using dBV.

9. What is the sum of two signals (-4 dBm and -3 dBm) in dBm?

10. What is the sum of two signals (-4 dBV and -3 dBV) in dBu?