PHYS 1210 Worksheet. Sound and Distance

1. Zero decibels corresponds to a sound intensity of 10^{-12} watts per square meter. How many watts per square meter would 80 decibels be?

2. What is the difference in intensity (W/m^2) between the quietest sound a human can hear (0 dB) and the loudest sound that is not painful (110 dB)?

3. If a sound has an intensity of 110 dB at 1.0 meters from the source, at what distance would its intensity be zero dB?

Doppler shift

$$f_D = f_S \frac{v - v_D}{v - v_S}$$

4. Find the Doppler frequencies at the detector f_D in terms of the source frequency f_S for the following scenarios:

   a. $v_s = v_d = 0$

   b. $v_s = 0$; $v_d = -0.1\ v$

   c. $v_s = +0.1\ v$; $v_d = 0$

   d. $v_s = 0$; $v_d = +0.1\ v$

   e. $v_s = -0.1\ v$; $v_d = 0$

   f. $v_s = +0.1\ v$; $v_d = +0.1\ v$

   g. $v_s = +v$; $v_d = 0$

   h. $v_s = -v$; $v_d = 0$

   i. $v_s = 0$; $v_d = +v$

   j. $v_s = 0$; $v_d = -v$