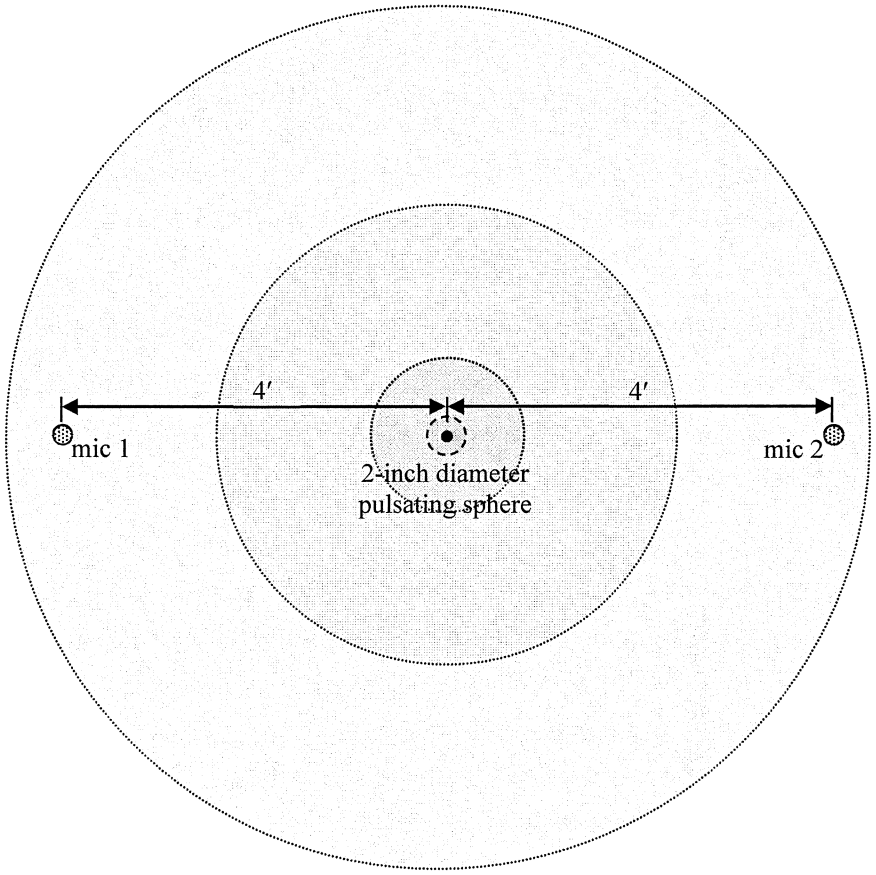
Due Date. Tuesday, December 12, 2017 before final exam period (5 PM). Email typed results and Matlab code to me (chris.richards@louisville.edu) and turn in handwritten work at the beginning of class.

Problem 1

Given measured radiated noise from a source, identify acoustic levels radiated from the source.

Experimental data.

Two microphones located 4 feet directly in front and directly behind a source simultaneously measure sound pressure in a free field environment. Measurements are made in air at STP.



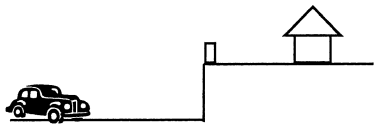
The Matlab data file project_2_data.mat posted on Blackboard under Course Material contains the variable mic(#, :), where # is the microphone location illustrated above. Unit of mic is Pascal. Data sample rate is f_s = 10 kHz.

Calculations and Analysis.

Assume the source is a monopole, i.e., an omnidirectional sound source. Using the experimental data provided, determine the sound pressure level, intensity level and sound power level at both locations. Also, calculate these quantities analytically using a function to represent the signals. Tabulate the experimental and analytical results along with percentage error. How valid is the monopole assumption?

Problem 2

A housing development is being constructed 15-m from the edge of a 5-m high cliff. Highway traffic (with a characteristic frequency equal to 550 Hz) travels 20-m from the bottom of the cliff. Determine the noise attenuation at the edge of the housing complex if a 3-m high wall is built at the edge of the cliff. Assume the wall to be a non-berm-like obstacle and the average listener to be 1.8-m tall.



Problem 3

Determine the length and diameter of a cylindrical muffler that produces a transmission loss of 15 dB at 100 Hz if the inlet and outlet pipes are 50 mm in diameter and the speed of sound is 381.9 m/s. Plot the transmission loss versus frequency and indicate frequencies were the muffler is ineffective.

Problem 4

A plane wave strikes a wall separating air and water with normal incidence. The three medium have the following properties:

Medium	Density (kg/m^3)	Speed of sound (m/s)
Air	1.20	343.1
Wall	1800	2100
Water	1000	1500

What is the lowest frequency (other than zero Hz) that the wall is LEAST effective at reducing sound intensity regardless of wall thickness?