

Prelab 1: Time & Frequency Plots

- 1) Draw the time and frequency- domain graphs for the clarinet.
- 2) Draw the time and frequency- domain graphs for a trumpet.
- 3) Comment on the prominent differences.

Prelab 2 - Wave Tank

- 1) List the 4 properties of waves.
- 2) For each, describe an experiment that can measure/verify this property for light waves.
- 3) Repeat the above for sound waves.

Prelab 3 - Resonant Flame Tube

- a) Consider the Table 1 Sort each entry into {solid, liquid, gas}, and then sub-sort based upon density. For the gasses, compute the AMU of each gas, and sort according to AMU. WHAT PATTERS DO YOU OBSERVE? Make detailed comments.
- b) What is the AMU of CH₄, methane?
- c) You are given the following pressure wave at $f=140\text{Hz}$, in a tube of length, $L= 2.4\text{m}$.
 - a) Find wavelength and the speed of sound in the tube.
 - b) Is the tube i) open at both ends, or ii) open at one end and closed at the other?
- d) Fire will be involved in today's lab. What are the two main precautions that the manual says should be taken?

Prelab 4 - Vibrating Chladni Plates

- 1) Consider a 1-dimensional vibrating bar. Assume the center AND the edges are anti-nodes. What is the wavelength of the resonant frequency in terms of the length of the bar, L ? Explain your answer and draw an example.
- 2) For a vibrating circular disk driven from the center, draw the first four harmonics. Estimate the wavelength of each resonance in terms of the diameter of the disk D ? Does this pattern make up a harmonic series?

Prelab 5: Wave Interference

- 1) What instrument makes a square wave on a time-domain graph?
What harmonics are involved in making that graph?
- 2) What instrument makes a saw-tooth wave on a time-domain graph?
What harmonics are involved in making that graph?

TABLE I
Speed of sound in various substances

| SUBSTANCE | TEMP. °C. | SPEED m/sec | SPEED ft/sec |
|----------------|--------------|----------------|-----------------|
| Air | 0 | 331.5 | 1087 |
| Air | 20 | 344 | 1130 |
| Hydrogen | 0 | 1270 | 4165 |
| Carbon dioxide | 0 | 258 | 846 |
| Water | 15 | 1437 | 4714 |
| Steel | — | 5000 | 16,400 |
| Helium | 20 | 927 | 3040 |
| Water vapor | 35 | 402 | 1320 |