General Instructions for Lab 1

The purpose of this lab is to familiarize you with the concepts of position and velocity and with some of the equipment we'll be using throughout the semester. Please read through the lab manual first. In the video we've posted, you can see one of the lab instructors [Jeana Zheng] demonstrating all the steps in the manual, including setting up the equipment and performing all the experiments.

Part 1 Experiments

Part 1 of this lab comprises four experiments:

- Measuring Position

- Checking on Capstone

- Measuring Velocity

- Doing Statistics on Velocity

Each experiment has its own set of instructions and questions. In your report, for each experiment you should describe the objective, the experiment setup, the results, the uncertainties in the results, and you should discuss what the results show and any sources of error in the experiment.

For your results, you should use the data we've provided. For experiment 2, *Checking on Capstone*, we've provided a data file called `ping-echo-data.csv` which has recordings of reflector distance (m) and ping echo time (s) for 15 trials. You should use this data to answer the questions in this section of the lab. For the other experiments, just use the data from the video.

Part 2 Experiments

The experiment in part 2 of the lab, Graph Matching, is quite hands-on so we've assigned you a slightly different task to what's in the manual. In the folder we've posted a file, `graph-matching.pdf`, that contains six graphs of either position vs time or velocity vs time. For each graph, your task is to describe the motion required to produce the graph. Be as detailed as you can.

Other Things to Note

If you're stuck on how to write your report, read over the report writing guide we've posted in the folder. It's not a rulebook, but it outlines some of the basic components your report should have.

Note that for this particular lab, there's not much theory—it's only position and velocity. In the future, labs will contain more theory, but for this one you can probably get away with a shorter theory section in your report.

Make sure you give the uncertainty in each measurement or data point you include in your report. There's more information on how to calculate uncertainties in the error analysis guide and the report writing guide. Read these over. For single measurements all you need to do is state the uncertainty, which is usually ± the last recorded significant figure. For arrays of data you may want to compute the standard deviation to get a sense for the spread of your data.

If you have any questions about the lab or how to write the report, don't hesitate to ask me during my office hours. Or email me.