Lab 7

Learning Objectives:

IV. How do I communicate science and Python with others? *How do I make publication-quality plots?*
This lab will give you the chance to practice annotating and customizing your plots to make them clear and accessible.

Part 0: Clone your repo

Clone your Lab 7 repository from GitHub as you've done for the other labs. You'll notice that it seems a bit sparse (other than a copy of the pdf for the lab). No need to worry! We'll be working with some of the lab material you produced last time (see below).

Part 1: Improve Plots from Previous Lab

Now that you're acquainted with the different options in matplotlib and have heard a brief intro to the principles of good plotting, you should go back and improve on the plots you made in Lab 6 in plotting displacement, velocity, and acceleration of a drop tower. (If you didn't complete those plots, please do so now.) Copy your `tower.py` and `droptower_vdata.txt` from your `lab6` repository into your `lab7` repository (from today's lecture).

Make the following plots all looking good with labels, titles, good line styles, etc. Also be sure to have them be saved in a publishable format!
1. Individual plots of the displacement, velocity, acceleration
2. All 3 lines on the same pair of axes (should be distinguishable and have a legend)
3. All 3 as subplots in the same figure

Experiment around and make whatever other plots you think will be interesting!

Part 2: (Optional) Strengthen Your Plotting Skills

Generate two random sets of 100 data points, ranged from 0 to 1, and store them in two arrays. The following exercise should help you become comfortable with the more detail-oriented aspects of plotting, as well as searching up what you don't know.

The figure:
1. Create a figure with 4 subplots, arranged in a 2x2 format. (They do not have to share the same axis values.) On the first subplot, create a scatter plot using the first 25 values in each array; on the second, use the second 25 values; so on and so forth.
2. Give each set of data points a different color and opacity.

3. Have the left two plots vary their data point sizes so that they correlate with increasing y values.

4. Have the right two plots vary their data point sizes so that they correlate with increasing x values.

    a. Challenge: Try to have the fourth plot vary its data point sizes so that they correlate with decreasing x values.

5. Get rid of the visible "tick" marks on each x and y axis.

6. Give each subplot a title, and then give the overall plot a title.

7. Experiment with the image you have just created—try to make it as aesthetically pleasing as possible! Possibilities include: playing around with spacing of the subplots, font size, and overall image size.

8. When you're done, save the final figure as a pdf-type file in your repository.