# Post-Lab Assignment
(due by Mon/Tue lab)

Submit answers to Slides 49 and 50 on Gradescope.

Slides 51-54 are group experiments that will be required for Unit 2 Report.

Free fall plot

➢ Plot only the accelerating portion of <u>one</u> of your datasets.

➢ Use np.polyfit to fit a quadratic curve to that plot.

➢ Find the value of g from this. (Hint : Use the kinematic equation $x = x_0 - 0.5gt^2$ and think about how it is related to the best fit curve)

➢ Estimate g from 4 more datasets and provide the mean and standard deviation for the value of g based on the 5 datasets. <u>You do not need to provide the other 4 plots</u>.
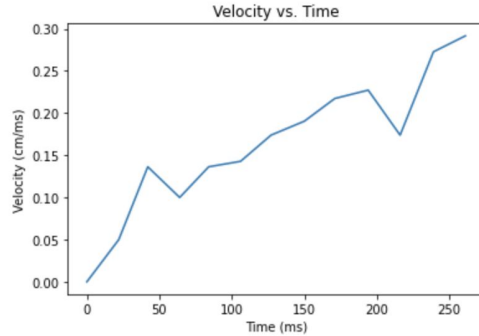
Datasets
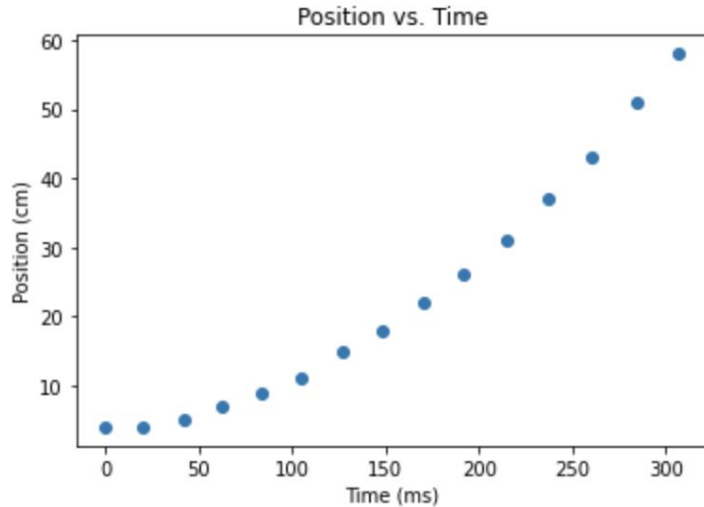
- g_1 = 10.32 m/s^2

- g_2 = 9.63 m/s^2

- g_3 = 8.23 m/s^2

- g_4 = 9.78 m/s^2

- g_5 = 7.61 m/s^2

- Mean: 9.11 m/s^2 Std: 1.02 m/s^2

Velocity and acceleration plot

➢ **Plot the velocity that you obtained from numerical differentiation for <u>any one</u> dataset.**

➢ **Plot the acceleration that you obtained from numerical differentiation for <u>any one</u> dataset.**

➢ **Find the value of g from this from the velocity plot (Hint : use np.polyfit of degree 1 and use the slope)**

➢ **Find the value of g from the acceleration plot (use np.polyfit of degree 0 and use the result)**

Differentiation

Velocity vs. Time

Acceleration vs. Time

- $g_{v\text{-plot}}$ = 9.10 m/s^2

- $g_{a\text{-plot}}$ = 11.41 m/s^2