# Between-Labs Assignment
(due by Wed/Thu Lab)

Submit the answers to questions Slide 27 and 30 on Gradescope before Wed/Thu lab.

Python plot of position data and best fit

➢ **Plot the position data obtained from Tracker on Python along with the plot of the best fit sine function to the position data in the same window.**

➢ **What is the value of spring constant from the best fit function? Compare this value to the spring constant obtained from Hooke's law. (You know the mass is 50 g)**

$$\omega = \sqrt{\frac{k}{m}}$$

- $k_{theoretical}$ = 2.65 N/m

- k_{actual} = 2.35 N/m

Position vs. Time for Spring Oscillator
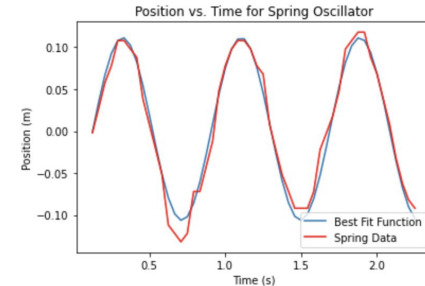
Simple pendulum review

➢ **Review simple pendulums here :**
https://openstax.org/books/university-physics-volume-1/pages/15-4-pendulums

Pendulum measurements

➢ **Hang a pendulum somewhere in your house. You can hang anything with a handle with no air resistance (mug, small bag, etc)**

➢ **If you don't have string, you can try using shoelaces, wires, cables, strips of fabric.**

➢ **Design the experiment so that you can collect both ultrasound data and you can collect video for Tracker.**

Pendulum measurements

➢ **Measure the length of string and calculate the theoretical frequency and period: (L = 0.444 m)**
  - **Period (seconds): 1.34 s**
  - **Frequency (Hz): 0.748 Hz**

➢ **Using a timer, measure the amount of time elapsed for 20 oscillations of the pendulum. What is the period you derive from this measurement?**
  - **Period (seconds): 1.465 s**
  - **Frequency (Hz): 0.683 Hz**

You will be using video and ultrasound data of the pendulum in future lab sessions/assignments.

Damped oscillations Review

➢ **Review damped oscillations :**
https://openstax.org/books/university-physics-volume-1/pages/15-5-damped-oscillations