3A Pre-Lab Assignment

Submit the answers to questions Slide 7,8 and 9 on Gradescope before Mon/Tue lab.

Simple harmonic motion (SHM) review

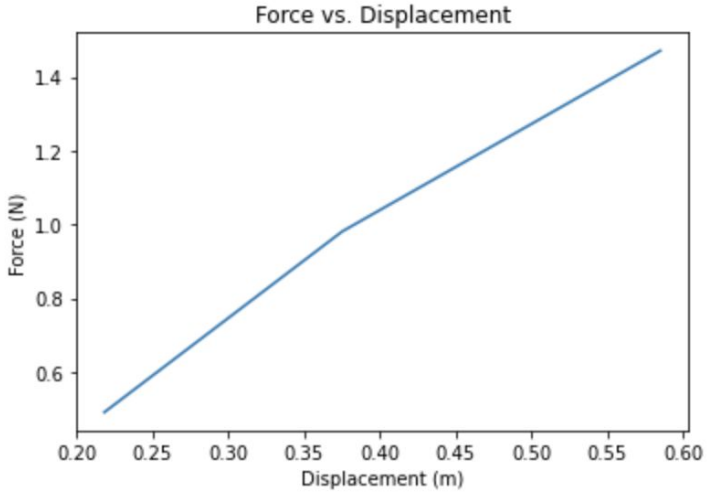
- **Use the following link to review simple harmonic motion :**
  https://openstax.org/books/university-physics-volume-1/pages/15-1-simple-harmonic-motion

Hooke's law

Identify the spring constant if you have the following information about a hanging mass and spring displacement. Check your units. Plot these values and use polyfit to find the spring constant with units of N/m (with error).

Mass (g)	Displacement (m)
50	0.218
100	0.375
150	0.585

```
k = 2.6545704342354917 N/m ± 0.3245556833828281 N/m
```



Python notebook

- Run the following notebook to process data for finding the best fit sine function that fits data. Use the sample data set.
- Print the final numbers you get:
  - Amplitude: 0.09m
  - Period: 1.19s
  - Frequency: 0.84Hz

Derivatives in SHM

What is the first derivative w.r.t t of $y(t)=A\sin(\omega t)$?

$y'(t) = A\omega\cos(\omega t)$

What is the second derivative w.r.t t of $y(t)=A\sin(\omega t)$?

$y''(t) = -A\omega^2\sin(\omega t)$

What quantities do these derivatives represent?

$y'(t)$ = S.H.O. Velocity $y''(t)$ = S.H.O. Acceleration