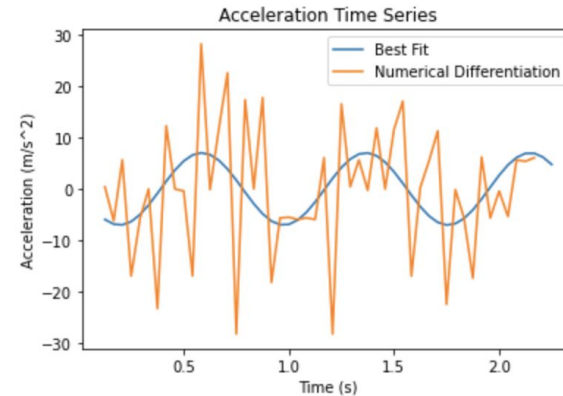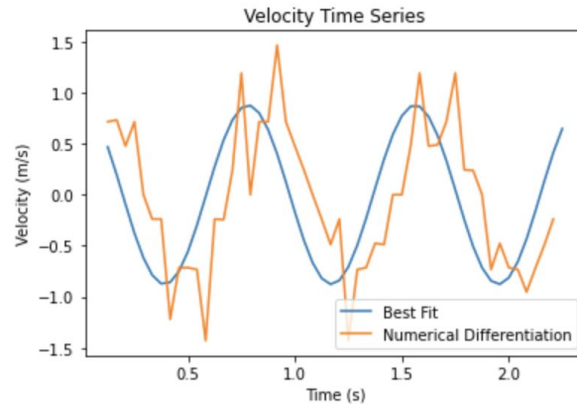# 3B Post-lab Assignment

Submit the answers to questions Slide 44, 45 and 46 on Gradescope before Mon/Tue lab.

Velocity and acceleration plots - 3A

➢ **Find the velocity and acceleration time series plots for the data from 3A using the best fit sin curve.**

➢ **Find the velocity and acceleration time series plots for the data from 3A using numerical differentiation on the original data.**
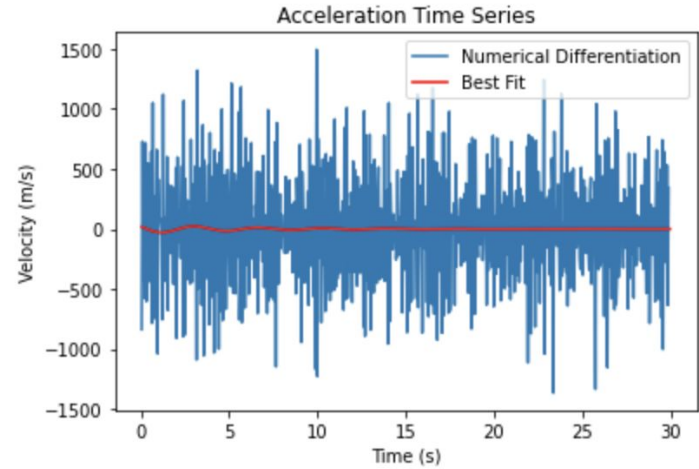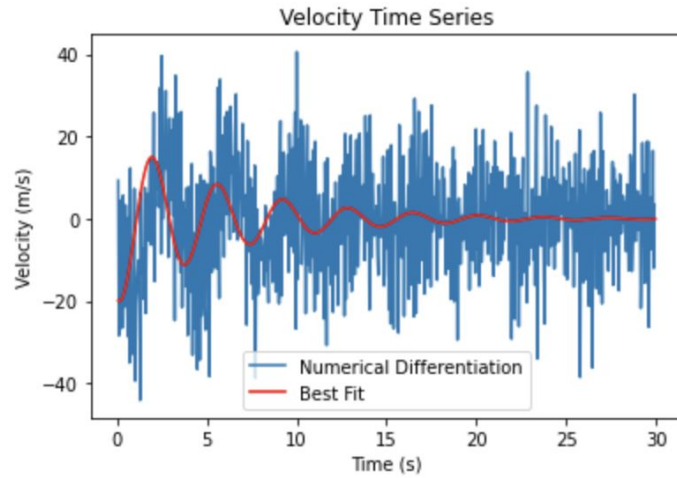
➢ **Find the velocity and acceleration time series plots for the data (from Slide 42) from 3B using the best fit curve.**

➢ **Find the velocity and acceleration time series plots for the data (from Slide 42) from 3B using numerical differentiation on the original data.**

$$x(t) = Ae^{\frac{-t}{\tau}}cos(\omega t + \phi)$$

$$v(t) = \frac{-Ae^{\frac{-t}{\tau}}(\tau\omega sin(\omega t + \phi) + cos(\omega t + \phi))}{\tau}$$

$$a(t) = \frac{Ae^{\frac{-t}{\tau}}(2\tau\omega sin(\omega t + \phi) + (1 - \tau^2\omega^2)cos(\omega t + \phi))}{\tau^2}$$

3B V and A Plots

Plots

➢ **Plot the damped oscillation data and the best fit curve for the pendulum data collected for the in-between lab assignment (for both tracker data and ultrasound data). Use the best ultrasound data available to your team and paste a picture of the setup that resulted in the highest quality data.**