PHYS2502 Mathematical Physics Lab #12 11 Apr 2022

This lab assignment is at 8am, the morning after the date shown, although you should able to complete it easily before the end of the lab period. When you're done, upload your executed MATHEMATICA *notebook to the Canvas page for the course.*

This lab is to get you used to some simple manipulations with data. The period T of a pendulum made of a light string of length l and massive bob is

$$T = 2\pi\sqrt{\frac{l}{g}}$$

where g is the acceleration due to gravity. The following are several data points I took with a pendulum made from a length of string and my keys tied to the end. I measured the time (in seconds) for *ten swings* for different lengths (in inches) of the string.

Length	Time
70	26.75
59	24.86
47	21.81
33	18.29
26	16.13
19	13.78
8	8.87

Use this data **or take some data of your own** for the following exercises:

(1) Use this data to create a list of lengths in meters, and periods in seconds.

(2) Calculate a value of g for each data point. It should be pretty close to what you expect.

(3) Calculate the average value $\langle g \rangle$ of your list of values of g using Mean.

(4) Calculate the standard deviation σ of these values using StandardDeviation.

(5) Use Show to combine a plot of the data points using ListPlot, and then use Plot to add three curves using your values of $\langle g \rangle$ and $\langle g \rangle \pm \sigma$. Use a different color for the curves with $\langle g \rangle \pm \sigma$. You can plot the curve in any way you'd like, including "linearized" by plotting T^2 versus l, or some other combination.