Lab 1 Submission Sheet

Keep answers as short as possible while still meeting specifications. Submit as a PDF.

## Acceleration Plots and Analysis

This submission item will cover multiple questions from the “Motherboard Validation, IMU Calibration, and IMU Error Measurement” section:

* How many m/s^2 does one accelerometer unit represent?
* What are the x, y and z axis zero acceleration measurements?
* Are the x, y and z axis zero acceleration measurements statistically different from one another?
* What are the mean, standard deviation, standard error and 95% confidence bounds for a static acceleration measurement in the z direction?

Answering these questions requires data from your accelerometer, which you should include in this submission as three graphs depicting data from the same trial, one showing x acceleration, one showing y acceleration, and one depicting z acceleration.

Effort Specification:

* ☐ Includes four plots of data from the accelerometer that show zero acceleration x data, zero acceleration y data, zero acceleration z data, and z data that reflects acceleration due to gravity.
* ☐ Plots are labeled (in title or caption) to indicate which is zero x, zero y, zero z and accelerated z.
* ☐ Accelrated z plot has different mean from other plots.
* ☐ Vertical scale is set to show variations in the data values.
* ☐ Y-axis is set so we can easily read off values.
* ☐ Includes some calculations for each question.

Complete Specification:

* ☐ Calcuations that relate acceleration due to gravity to one Teensy unit are correct.
* ☐ Take the mean of data to calculate the resting zero acceleration values. Report them clearly.
* ☐ Includes description of how to calculate descriptive statistics and correct values.
* ☐ Includes description of how to calculate T tests and results of tests on data.

## Paste the code used to navigate the obstacle course

Effort Specification:

* ☐ Present and reasonable.

There is no complete specification for this deliverable.

## Plot acceleration measurements vs. the sample number from a run in the obstacle course. (No need to convert the x-axis to time.)

Effort Specification:

* ☐ Present and interpretable.

Complete Specification:

* ☐ Shows multiple acceleration events that suggest motion through an obstacle course.
* ☐ Scale is legible and data is cropped to just the run through the obstacle course, omitting getting the robot into the tank, fishing it out, etc.

## Write a formula for peak acceleration of a robot from rest, calculate the predicted acceleration that formula makes, and compare that value to the peak acceleration observed in your measurements.

Effort Specification:

* ☐ Appropriate governing equation copied from E79 notes.
* ☐ Equation manipulated into a form that predicts peak acceleration from rest.

Complete Specification:

* ☐ Manipulated equation is fully correct and well explained.
* ☐ Annotation of the obstacle course acceleration plots show the measured peak acceleration from rest.
* ☐ Theoretical numbers for thrust extracted from E79 resources.
* ☐ Thrust and mass are used to predict theoretical peak acceleration.
* ☐ Comment on differences between theory and measurement.