Experiment Problem Set One
Due Wednesay, February 20, 2013

Prior to First Experiments: Acquire a laboratory notebook (any notebook with fixed pages will do). For every experiment record the day, time of day, and partners involved at the beginning of the day's experiments.

Prior to all experiments: check your battery voltage! Charge if necessary.

Experiment 1. Getting familiar with the GUI and measuring Speed
Mark an approximately 1 meter distance on the ground with tape (start line and finish line). Measure the distance and record it on a piece of paper. (NOTE: if a prior group has already marked the ground, just measure their distance.)

Put the CASSY robot in front of one mark (perhaps by ½ meter). The blue battery pack represents forward on the CASSY.

In the GUI, "Connect" to your CASSY (Benny in this case.) Set up the GUI panes to allow you to record time, V1, V1_Ref, and u1 (at least).

Data Set 1. Maximum velocity (approx .4 m per sec … should take 2.5 sec)
Using the GUI, set up an experiment with maximum V1_REF, five seconds, open loop control, step reference.

Using a stop-watch, measure the time between when CASSY passes the first mark (start timing) and the second mark (stop timing). Record this time for five trials. Save the data file (ABWCommData.0.txt through ABWCommData.5.txt) and transfer off the computer (say to a jump drive).

Compute the average velocity calculated from your distance divided by measured time and the value measured by the CASSY robot from the GUI (V1 in the GUI – not V1_Ref!).

Data Set 2. Half velocity (approx .2 m per sec should take 5 sec)
Set V1_Ref to half the maximum value and repeat the measurements.

Data Set 3. Minimum velocity
Set V1_Ref to the smallest number. Increment V1_Ref until the CASSY starts to move (this may be as high as 0.1 meters per second. Once you have found a minimum velocity that will complete the 1 meter in no more than 10 seconds, repeat the measurement above.

Post-processing
Plot the calculated values of V1 versus the values of V1 from the GUI in a graphics/plotting program (not a hand plot) such as matlab or excel. Perform a regression fit to your points and plot the regression line on the same plot.

Import the graph into a word-processor and describe your data and experiment. Make sure you cite your figure in the text and make sure you label the graph so that a reader can figure out what the graph means. Turn in a print-out of the report (no more than one page).