

**EXAM 1 – Computer PORTION**

Put all of your code in one script and name it: `lastname_firstname.m` (all lower case). Include your name, section number, and CM number in the header section of your code. There should be no output other than what is requested.

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**Problem (52 pts)**

For this exam problem, we will work with the file `rocket_height.mat` posted on the course website. It contains experimental data from three launches of a rocket. The first column is the time of the measurements (in seconds), and the second through fourth columns are the measured altitudes of the rocket (in meters). (Each column is the data from one of the launches.)

a) (20 points) Download the data from the website. Load the data into Matlab. Plot the rocket altitude as a function of time for the three sets of launch data on one figure. You may use the default lines for the plots. Add good labels, a good title, and a proper legend. Remember to include units.

b) (20 points) The theoretical solution for the rocket altitude as a function of time when there is no air drag is

$$h = v_0 t - \frac{1}{2} g t^2$$

For this launch the initial velocity ( $v_0$ ) was 200 m/s and the total time was 20 seconds. You may take  $g$  to be 9.8 m/s<sup>2</sup>.

Change your original script to plot the theoretical solution for the rocket altitude on the same figure as the experimental data. Adjust your legend appropriately. If you are unable to get this part working you may still proceed to part c.

c) (12 points) We wish to plot the average of the three experimental data trials. (That is, for any given time, we wish to plot the value which is the average of the three measurements from that time.) Add code to your script to make a *new figure* and plot this average as a function of time. You may use the default line for the plot. Add good labels and a good title. Remember to include units.

When you are done, put your script (`lastname_firstname.m`) in the Moodle dropbox.

NOTE: All programming must stop at 10:40 AM. You will have five minutes after that to put your file in the dropbox if you need that time.