EXAM 1 – Computer PORTION

Put all of your code in one m-file 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 asked for.

Problem (50 pts)

Download the Excel spreadsheet named "`accel_data.xls`" from the course web page at `http://www.rose-hulman.edu/ME123/courseware.shtml`

The data file you have is the output of an accelerometer mounted on a test vehicle. It contains two columns of data. The first column lists the time in seconds while the second column lists the accelerometer reading in g's. (One g is 32.2 ft/s^2.) The time data is evenly spaced; the difference between all times is a constant.

Write a MATLAB code to

a) (20 Points) Read in the data stored in the Excel spreadsheet. Convert the data in the acceleration column so that it has units of ft/s^2 by multiplying it by 32.2. Next, have your program open a text file named `lastname_firstname.txt`, where `lastname` and `firstname` should be replaced by *your* last and first names, respectively. A table is to be printed to this text file. Specifically, you should start with Row 1 of the data, and print every 40th row until the last row is reached. Do not forget to use the **`fclose`** command in your code. The first 2 lines of the text file should be:

```
Time (sec)      Acceleration (ft/sec2)
   0.000               -0.029
   0.400                3.056
    ..                    ..
```

b) (15 Points) Plot acceleration in ft/s^2 as a function of time based on the data. Properly label both axes, and give your plot a title.

c) (15 Points) Assume that the cart starts its motion at a velocity of zero. Find the velocity of the cart (in ft/s) at the end time. Hint: if we let t_i stand for the time in the i^{th} row, and a_i stand for the acceleration in the i^{th} row, we can approximate this velocity by the formula,

$$v = \sum_{i=1}^{N-1} a_i \, \Delta t$$

Here N is the total number of rows, and Δt is the time difference between any two consecutive data points, *e.g.* $\Delta t = t_2 - t_1$. Print the final velocity in the command window using the format shown.

```
The final velocity is ###.###.
```

When you are done, post your m-file answer to the correct folder:
1. Launch a Windows Explorer window by clicking on the folder icon menu bar at the bottom of your screen..
2. Click on the "DFS Root" folder in the upper left corner of the Explorer window.
3. Double-click on Academic Affairs.
4. Double-click on ME.
5. Double-click on ME123.
6. Double-click on Exams.
7. Double-click on the folder with your section number.
8. Copy and paste your m-file to this folder.

NOTE: All programming must stop at 8:30pm. You will have a few minutes after that to post your file if you need that time.