

ENGINEERING H192
DAILY ASSIGNMENT B13

A data file named **b13.dat** can be found in `~engh192/students`. Copy **b13.dat** to your working directory. The file contains data from one test of an instrumented bicycle from an engineering hands-on lab experiment. You should look at the file on the screen (with a "**more**" command), but **DO NOT** print it out, as it contains several thousand (but less than 10,000) lines of data. You will note that at the beginning of the file there are several lines of "header" information followed by many lines of data in four columns. Count by hand the number of lines from the beginning of the file until you get to a line that has the actual data in the four columns. (You will need this number in Step 2 below.) The fourth column is the raw strain data (voltage) values from the lab experiment. Note also that the "header" information includes the sampling rate.

Write a complete C/C++ program, **b13.cpp**, which does the following:

1. Opens the data file for input.
2. Reads in the correct number of header lines one by one, displays each one on the screen and writes each one to a result file (say, **b13result.txt**). The header information must be read by your program, written to the screen, and written to the result file, but is otherwise not used by your program.
3. Inputs each of the lines of data arranged in the four columns, discarding the data values from each of the first three columns and storing only the data from the fourth column in a one-dimensional array. For skipping over the columns with unwanted data, you will need to use the assignment suppression operator, `*`, in the **scanf()** format specifiers. Your program will need to detect the end-of-file (EOF) to know when to stop reading data. Close the input file when you reach the EOF.
4. Finds the largest value in the array and the smallest value in the array. Also determines the elapsed time in seconds between the largest and smallest values.
5. Displays the results on the screen, and also writes the results to the output file, **b13result.txt**. The results to be displayed and printed are:
 - The total number of data points in the file
 - The maximum voltage and time at which it occurred
 - The minimum voltage and time at which it occurred
 - The elapsed time between the maximum and minimum values
6. Calculates the strain, ϵ , for the maximum and minimum voltage values, using the appropriate expressions from the hands-on lab experience. Displays these values on the screen with proper engineering units, and writes them to the result file as well.

Compile, link and test your program. Debug it as may be needed. When it is running correctly, print your source code, **b13.cpp**, and the output file your program generated, **b13result.txt**, and submit both of them along with this sheet.

Name _____ Instructor _____ Seat _____ Hour _____