**CSCI 40 / ENGINEERING 40 MID-TERM PROJECT**

**LINEAR INTERPOLATION OF FLIGHT RECORDER DATA**

Altitude data from a rocket flight recorder is stored in a data file named **flight.txt**. The data in this file are arranged in two columns. The first column values are times listed in seconds, and the second column values are the heights in meters that correspond to these times. There are sentinel values (-999) after the last line of valid data to indicate the end of data. The time values are always in ascending order but do not necessarily start with zero.

An example of a data file is shown below:

2.0 15.7

3.0 23.3

5.0 38.7

10.0 72.3

20.0 128.9

30.0 168.3

40.0 192.5

50.0 200.1

60.0 192.8

70.0 168.3

80.0 128.4

90.0 72.7

-999 -999

Write a program that will work with a data file that is structured like the file described above. You will not know how many data values are in the file ahead of time, but you may assume that, like the example above, the last line will be sentinels -999 -999.

Your program should do the following:

1. Ask the user for an input time (in seconds).
2. Use this input time and the data file **flight.txt** to determine the corresponding height of the rocket (in meters).
3. Print out the input time and the corresponding rocket height. Don’t forget to include the proper units (seconds and meters) as part of your output. If the input time is outside the time range covered by the data file, then your program should print a message to that effect and not try to determine the corresponding height.

When the input time matches a time in the data file, the corresponding height will also be in the data file (it will be the very next data value). When the input time is between two adjacent times in the data file, your program will need to linearly interpolate the data to determine the height corresponding to the input time.

(Over)

Note on linear interpolation:

If an input time *t* is between  and  in the data file, then the height *h* corresponding to it can be determined from the equation:



whereand are the heights that correspond toandrespectively.

**Properly document your source code. It will be part of the grade on this assignment.** Email me your source code (make it an attachment to an email to [chris.glaves@scccd.edu](mailto:chris.glaves@scccd.edu)). I will test it on a file that I build.