Programming Assignment #5

Compute Cereal Box Statistics

CS 1428.253, Spring 2019
Instructor: Jill Seaman

Due: before class **Tuesday, 4/2/2019** (upload electronic copy by 9:00am)

Problem:

You will write a program to compute some statistics about boxes of a popular breakfast cereal called "Chocolate Frosted Sugar Bombs" manufactured by the General Junkfoods Corporation. Automated machinery is used at the company's factory to fill individual boxes with cereal. No machine is perfect, so the amount of cereal actually in a box will vary slightly from box to box.

The data file CFSB.txt on the class website gives the weight (in ounces) of the last 1,000 boxes of Chocolate Frosted Sugar Bombs produced in the factory.

For every box in this sample that weighs less than the advertised 20 ounces, General Junkfoods will incur a $250,000 fine.

The statistics you must compute in your program are:
- The average weight of the "20 ounce" boxes of cereal.
- The standard deviation of the sample (see below).
- The number of boxes below the advertised weight of 20 ounces.
- The fine owed by the company for the underweight boxes.
- The maximum value of the weights of the 1,000 boxes.
- The minimum value of the weights of the 1,000 boxes.

Input:

Your program should ask the user for the name of the file, and then open that file for input. The remainder of the input data will come from that file. You may assume that the file contains 1000 values, each with three digits after the decimal point, corresponding to the weights of the cereal boxes.

Processing: Compute the statistics requested above.

The standard deviation should be computed as follows:
1. For each number in the data set, subtract the average, and square the result.
2. Compute the average of these squared differences.
3. Take the square root of the result.

Output: Display the statistics, labeled, and with the statistics formatted to 3 decimal places. Sample output:

```
Please enter the name of the data file: CFSB.txt

Chocolate Frosted Sugar Bombs statistics:

Average weight: 20.505
Standard Deviation: 0.204

Number of boxes below 20 ounces: 4
The fine for this is: $1000000

Maximum weight of all boxes: 21.103
Minimum weight of all boxes: 19.946
```

Additional Requirements:

- Your program should test for file open errors.
- You can use `pow(x,2)` to square x, and `sqrt(x)` to get the square root of x (these functions require the `cmath` header file to be included).
- You should have at least 4 separate loops in your program.
- Your program **must compile** and run, otherwise you will receive a 0.
- See the Style Guidelines document on the course website. The grader will deduct points if your program violates the style guidelines. Make sure it is indented neatly.

Logistics:

Name your file **assign5_xxxxx.cpp** where xxxxx is your TX State NetID (your txstate.edu email id). The file name should look something like this: assign4_js236.cpp

There are two steps to the turn-in process:

1. Submit an **electronic copy** using the Assignments tool on the TRACS website for this class (tracs.txstate.edu). Submit the .cpp file, (NOT a .cbp file!).
2. Submit a **printout** of the .cpp file at the beginning of class on the day the assignment is due. Please print your name on the front page.

See the assignment turn-in policy on the course website (cs.txstate.edu/~js236/cs1428) for details, including deadlines, penalties, and where to submit printouts after class.