ITEC 120: Principles of Computer Science I

Homework 8 – Spreadsheet simulator

>>>>>>>> Due Date: Friday, March 23rd at 10:00 PM via Desire2Learn <<<<<<<

In doing this homework, remember to abide by the RU Honor Code.

Problem 1
30 points

Archival Inc. has hired you to create a simple command line spreadsheet simulator so people can experience how spreadsheets were used before modern office software was created. Your boss wants an interactive command line simulator that allows users to create a two dimensional grid of double variables of varying size. Users can enter values by specifying what row and column to place a particular value. Once the spreadsheet is populated, the user can either calculate the sum or standard deviation of values in a certain range. Due to the simplicity of the simulator, these abilities are limited to one dimension (horizontal or vertical).

Input
Your program will be given a series of commands to manipulate the spreadsheet. The commands are as follows:

Command	Description
create	Creates a spreadsheet of doubles of the requested size.
enter	Sets a particular value in the spreadsheet.
print	Prints out the spreadsheet.
sumv	Sums a range of values vertically (starting location + length).
sumh	Sums a range of values horizontally (starting location + length).
stddevv	Calculates the standard deviation for a range of vertical values.
stddevh	Calculates the standard deviation for a range of horizontal values.
help	Prints out all of the commands that the program can accept.
quit	Stops the simulator.

Computation
All of your commands should ensure the array representing the spreadsheet exists if applicable, and ensure the values being accessed/set are within the range of the created array.

For the create command, your program will create a two dimensional array of doubles of a size specified by the user. The created array will then be used with the other commands the simulator accepts.

For the enter command, your program will ask the user for the position in the array to set, then the value to set, and then set the value in the array.

For the print command, your program will print out the contents of the spreadsheet in a grid like format.

For the sumv and sumh commands, your program will add all of the integers in the rows or columns specified by the user (i.e. row 0, column 1, number of rows to sum 3) and print out the result to the user.

For the stddevv and stddevh command, your program will calculate the standard deviation for the rows or columns specified by the user (i.e. row 0, column 1, number of rows to sum 3).

For the quit command, your program will stop.

For the help command, your program will print out the commands that the simulator will accept.

Output
Make sure your program outputs the proper prompts for the user so they know what information is being requested. Also, make sure the output of the calculations is easily identifiable.

Sample input:
```
create
4
4
enter
0
0
5
enter
0
1
2
enter
0
2
3
enter
1
0
2
enter
2
0
```

```
3
sumv
0
0
3
sumh
0
0
3
stddevh
0
0
3
print
quit
```

Output from previous commands:
Enter command>sumv
Enter row>0
Enter column>0
Enter length>3
The requested sum is 10.0
Enter command>sumh
Enter row>0
Enter column>0
Enter length>3
The requested sum is 10.0
Enter command>stddevh
Enter row>0
Enter column>0
Enter length>3
The requested standard deviation is 1.5275252316519468
Enter command>print
5.0 2.0 3.0 0.0
2.0 0.0 0.0 0.0
3.0 0.0 0.0 0.0
0.0 0.0 0.0 0.0

Testing note: your program must allow for a file to be redirected as input to the program (java programName < fileName.txt). If it does not, then you will receive a 0 on this program. As long as you use one scanner and pass it around as a parameter, this will not be a problem.

Constraints:
You must use at least two functions in your solution. You must also submit a test case that is similar but not identical to the previous usage scenario. By doing so, you demonstrate that you have tested your program beyond the basics.

No fields, instance, or class variables may be used in this program. If you don't know what they are, don't worry about it. The purpose for this rule is to make sure you must pass information through the program with parameters.

The reference solution for this project is 138 lines of code without comments. Feel free to use less or more code in your program.

Submission requirements:
You must submit the .java file containing your program to Desire 2 Learn under the Homework #8 assignment. If your submitted file does not compile, it will receive a 0. You can demo the homework the next school day after it is due, or it will be graded automatically. If you choose not to demo your homework you cannot contest the grade you receive.

Grading Rubric
12 Points – Does it correctly calculate the sum and standard deviation ?
8 Points - Does it correctly enter and print values?
5 Points - Is the program commented using inline and javadoc comments?
3 Points – Was a suitable test case submitted with the program?
2 Points - Does it use 2D arrays properly?