

ITEC 120: Principles of Computer Science I

Homework 5

>>>>> **Due Date: Friday, February 21st at 10:00 PM via Desire 2 Learn** <<<<<<<

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

Problem 1 - Array simulator

15 points

Arrays are a foundational programming tool used across most programming languages; are used for storing an unknown (at compile-time) number of integers or strings. Arrays can provide part of the solution for several industrial sized problems. For example, in the gaming domain, arrays can be used to store the HP values for all of the monsters in a level. A game developer can tell what the strongest and weakest monsters are, and the average HP of a monster that players deal with on that level. A non-gaming example could deal for farmers. For farmers, arrays could store the weight of cattle in a herd. The heaviest cow could be kept for breeding, while the lightest cow would be checked for disease to make sure it isn't sick. It could also be used to tell the farmer the average weight of their cows.

Typical command line programs follow a standard pattern of run, enter input, and review output. Command line simulators allow for end users to type in a variable number of commands into a program, and end when the user types quit. Simulators allow for a simpler and more expressive form of interacting with command line programs.

Here is an example showing how to build a command line simulator that reads in any number of commands until the word "quit" is typed on a line by itself.

```
Scanner scan = new Scanner(System.in);
String command;
System.out.print("Enter command>");
command = scan.nextLine();
while (!command.equals("quit"))
{
    //Code to do something with the command here

    //Read in next command
    System.out.print("Enter command>");
    command = scan.nextLine();
}
```

Your job is to write a program that can be used by a game developer or a farmer to keep track of their information and to print out statistics based on what they enter. Your program must use a simulator for commands and manage an array of integers. Refer to

the input section for a list of the commands your program's simulator must accept and the computation section for a description of what each command should do.

Input

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

Command	Description
create	Creates an array of integers of the requested size.
set	Sets a particular value in the array.
print	Prints a particular value in the array.
sum	Prints out the sum of the array of integers.
min	Prints out the smallest value in the array.
max	Prints out the largest value in the array.
average	Prints out the average value in the array.
help	Prints out all of the commands that the program can accept.

Computation

All of your commands should ensure the array 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 an array of integers of a size specified by the user. The created array will then be used with the other commands the simulator accepts.

For the set 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 ask the user what position in the array to print, and will then print the value stored in the appropriate position.

For the sum command, your program will add all of the integers in the array together and print the result.

For the min command, your program will print out the smallest value stored in the array.

For the max command, your program will print out the largest value stored in the array.

For the average command, your program will print out the average of all values stored in the array.

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

Output

Your program will print out one (or multi) line message(s) that displays the result of the requested command.

Sample usage scenario :

```
Enter command>help
Possible commands are help/create/set/print/sum/min/max/average
Enter command>create
Enter size of array>2
Enter command>set
Enter position of array to set>0
Enter value to set>3
Enter command>set
Enter position of array to set>1
Enter value to set>1
Enter command>sum
Sum of numbers is 4
Enter command>min
Smallest is 1
Enter command>max
Largest is 3
Enter command>average
Average of numbers is 2
Enter command>quit
```

Hint: Try writing code to do the commands on an array outside of a simulator. Once you have them working, then add them to the simulator code **Also, come up with your own test cases, when I test your program I will use test cases other than the ones listed in the assignment.**

Constraints:

You must submit at least one usage scenario that is not included in this specification when you submit your program and ensure that it is non-trivial. Use the Desire2Learn comment functionality when submitting the assignment.

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 92 lines of code without comments. Feel free to use more or less code in your solution. This number is provided to help you gauge the difficulty of the assignment.

Submission requirements:

You must submit the .java file containing your program to Desire 2 Learn under the Homework #5 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

10 Points - Do the sum, average, min, and max commands work properly?

3 Points - Do the set and print commands work properly?

2 Points - Did you include a reasonable test case with your program?