Software Development 1, Lab 4

This is individual assessed coursework. You are allowed to discuss this assessment with other students, but you should not copy their code, and you should not share your own code with other students. Note that we will carry out plagiarism checks on all submissions.

This lab script consists of **three tasks**, which require you to apply your knowledge of arrays and methods (see lectures in Week 4) in addition to other topics covered in previous lectures. You should attempt to **complete all tasks before getting your solutions marked**.

The deadline for completing this lab is the end of the lab session in Week 6. Before this deadline, you should show your code (whether you have completed all the tasks or not) to either a lab helper or your lecturer, and also upload your code (as instructed at the end of this document) to Vision. Uploading your code to Vision is mandatory; you will not receive any marks if you do not do this.

Task 1

Write a program, called **`BarChart`**, that displays a bar chart on the terminal when given a list of numbers. It should behave something like this:

```
How many bars would you like to display:
5
Specify the sizes of the bars:
7 10 5 2 6
1 * * * * * * *
2 * * * * * * * * * *
3 * * * * *
4 * *
5 * * * * * *
```

Your program should:

- Store the numbers in a one-dimensional array of an appropriate size.
- For each element in the array, use a loop to display a bar of the appropriate length.
- Be correctly formatted and have appropriate comments.

You will get **5 marks** for a correct program.

Task 2

Make a new class called **`CustomBarChart`**, copy and paste the code from Task 1, and extend it so that:

- The user can specify the character symbol to be used to display each bar.
- The bar is drawn by a separate **method** within your program. This method should receive two arguments: the character it should use to draw the bar (this should be the character chosen by the user), and the length of the bar.

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It should behave something like this:

```
How many bars would you like to display:
5
Specify the sizes of the bars:
7 10 5 2 6
Specify the symbols to be used for the bars:
o + > | -
1 o o o o o o o
2 + + + + + + + + + +
3 > > > > >
4 | |
5 - - - - - -
```

You will get **3 marks** for a correct program (2 marks for correctly reading and using the characters provided by the user, 1 mark for creating and using a separate method to draw a bar).

Task 3

Make a new class called **`CustomBarChartMean`** and extend your code from Task 2 by adding a **new method** that calculates **and returns** the mean of all the bar sizes. This should be called from the main method and the result used to draw an average bar below the others using the method you wrote in Task 2. For example:

```
[initial user interaction is the same as for task 2]
1 o o o o o o o
2 + + + + + + + + + +
3 > > > > >
4 | |
5 - - - - - -
A * * * * * *
```

You will get **2 marks** for a correct program.

Next, show your solutions to a lab helper or your lecturer. Once they have marked your work, **upload your .java file for each task to Vision** using the appropriate submission link found in the Lab 4 folder under the "Assessment" tab. If you have not been able to finish all the tasks, please show us what you have been able to do, and then upload the solutions to Vision.

All of your solutions to Lab 4 must be uploaded to Vision by midnight on Friday 19th October. Late submissions will be marked according to the university's late submissions policy, i.e. a 30% deduction if submitted within 5 working days of the deadline (e.g. within the following lab), and no mark after that. If you have mitigating circumstances (e.g. illness), please submit the form available at: https://www.hw.ac.uk/students/studies/examinations/mitigating-circumstances.htm