CS 101 - Algorithms & Programming I

Fall 2021 - Lab 2

Due: Week of October 11, 2021

*Remember the **honor code** for your programming assignments.*
*For all labs, your solutions must conform to the CS101 style **guidelines**!*
All data and results should be stored in variables (or constants where appropriate) with meaningful names.

The objective of this lab is to write basic Java programs that take inputs from the user and generate respective outputs on the console/terminal. The outputs are expected to have a certain formatting to achieve user friendliness. As always, this process will include program design & debugging. Remember that analyzing your problems and designing them on a piece of paper *before* starting implementation/coding is always a best practice.

0. Setup Workspace

Start VSC and open the previously created folder named `labs`. Now, under the `labs` folder, create a new folder named `lab2`.

In this lab, you are to have three Java classes/files (under `labs/lab2` folder) as described below.

1. Rectangle Properties

Create a new/empty file of your own under the `lab2` folder named `Lab02_Q1.java` with a class with the same name that takes two **double** inputs from the user to calculate the area, the circumference, and the diagonal of a rectangle. The user inputs are shown with blue color below.

Sample Run

```
Enter the width of the rectangle: 12.3
Enter the height of the rectangle: 24.1

The area of the rectangle is            :         296.430
The circumference of the rectangle is   :          72.800
The diagonal of the rectangle is        :          27.057
```

2. Maintenance Cost of a Car

Create a new/empty file of your own under the `lab2` folder named `Lab02_Q2.java` with a class with the same name. This time your program will take the odometer (an instrument used for measuring the distance traveled by a vehicle) reading of the car in kilometers (km) as an input from the user (shown in blue) and will calculate and display a table as exemplified below. Total maintenance cost of the car is directly proportional with the kilometers travelled and is equal to 0.1 TL (constant) for each kilometer. That is, if the car has been driven for 10000 km, the total cost of maintenance is 1000 TL. The percentages shown indicate the percent of each maintenance item. Declare the percentages shown as constants; changing the value of these **constants** only should update the results. You should **NOT** repeat the space character in the output.

Sample Run

```
Enter the odometer reading of the car in kilometers: 60000

************************************************
*****  Maintenance Cost Distribution Table  *****
************************************************
*Oil Change           %30           1800.00     *
*Battery              %15            900.00     *
*Brakes               %25           1500.00     *
*Tire                 %13            780.00     *
*Other                %17           1020.00     *
*                     TOTAL         6000.00     *
************************************************
```

3. Strings Incorporated

Create a new/empty file of your own under the `lab2` folder named `Lab02_Q3.java` with a class with the same name. This time your program will take a title as an input from the user and display each one of the following in a separate line. A sample run is given below where the input is highlighted with yellow color. Note that, the entered title has 3 spaces at the beginning and 4 spaces at the end. You can use the **Lang** package's **String** class and its methods. For details about the String class and possible methods to use, see: https://docs.oracle.com/en/java/javase/11/docs/api/java.base/java/lang/String.html.

a) Print number of characters in the string

b) Convert all characters to uppercase and print

c) Remove the leading and trailing whitespaces from the string and print

d) Print the character at index 5

e) Print the substring of title from 3rd character (inclusive) to 8th character (exclusive)

f) Print the index of first occurence of character 'a'

g) Print the index of last occurence of character 'a'

Sample Run

```
Enter the title:    War and Peace
-------------------------------------
Number of characters:20
All uppercase:   WAR AND PEACE
Remove leading and trailing blank characters:War and Peace
Character at index position 5:r
Substring from 3rd character(inclusive) to 8th character(exclusive): War
First occurence of character 'a':4
Last occurence of character 'a':13
```