CS101 - Algorithms & Programming I

Fall 2024 - Lab 2

Due: Week of October 7, 2024

*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.

Inputs of the sample runs are shown in **blue**.

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. Two more Java files containing the revisions should go under this folder as well. We expect you to submit a total of 5 files including the revision, **without compressing** them. Do *not* upload other/previous lab solutions in your submission.

1. User I/O Calculations

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 a **double** input from the user, representing the volume of a sphere. Using the volume determine the length of the radius of the sphere and the surface area. The user inputs are shown with blue color below

$$r = \sqrt[3]{\frac{3V}{4\pi}} \qquad A = 4\pi r^2$$

and outputs the results as below:

```
Enter volume of sphere: 76.0
The radius of the sphere is:                2.6
The surface area of the sphere is:         86.8
```

Make sure that the type of values in these expressions are **coded exactly as provided**. Also, make sure that the output is **formatted exactly as shown**.

2. Formatted Output

Create a new/empty file of your own under the `lab2` folder named `Lab02_Q2.java` with a class with the same name. Write a Java program that inputs the weights of two people on earth and calculates and displays their corresponding weights on 4 other planets. You can calculate for any 4 planets that you choose. Store the gravity multipliers as constant values.

If you were to go to another planet, although your mass would remain the same, your weight would change because gravity on other planets is different. If you know your weight on Earth, you can calculate your weight on another planet using that planet's surface gravity.

Source: sciencenotes.org

Sample Run:

```
Enter weight of first earthling(kg): 55
Enter weight of second earthling(kg): 115
                                  MERCURY       VENUS        MARS     JUPITER
        EARTHLING ONE( 55.0kg)       20.9        50.1        20.9       128.7
        EARTHLING TWO(115.0kg)       43.7       104.7        43.7       269.1
```

3. Working with Strings

Create a new/empty file of your own under the lab2 folder named Lab02_Q3.java with a class with the same name. Write a Java program that inputs a date and time in the format shown below. Using String methods, your program should output the date and time with the format shown below. **You should not use regular expressions.**

You may make the following assumptions about the date/time input:

- The symbols shown between the fields below are always the same.
- There may be spaces between the symbols and the fields but only spaces. You should remove (hint: trim) the spaces.
- The time is always in this format: HH:MM.

Sample Run:

```
Enter date and time: 2024  /September /  25, Wednesday- 09:30
Date: 25
Day:  Wednesday
Month:September
Year: 2024
Time: 30 minutes after 09
```