CS 111 – Introduction to Computer Science – Fall 2017

Lab Assignment #2
User Input * *(20pts)*

Due Date: at 11:59pm on Saturday, February 24.

The purpose of this lab is to provide practice working with functions from Python's standard library and with extracting data from a user via standard input.

⚠️ Before getting started with the lab, copy the entire `lab2` folder from the course folder (`H:\Compsci\givens\cs111`) to your `U:\cs111` folder.

> 💡 **Note**
> When working with the files provided for the lab, do not rename any of the files unless you are told to do so. In addition, when you create a source file from scratch, you must name the file exactly as indicated. You are not to change the case of any letter, add blank spaces, or add any additional characters.

Debugging

The Python syntax is very strict as to how statements can be constructed. While it would seem easy to avoid errors in small programs, sometimes the error is so slight that it's not easily noticeable.

⚠️ Load the `roots.py` program from your `U:\cs111\lab2` folder into the *Wing* IDE. Add your name and today's date to the file prolog.

This is a small program that is supposed to prompt and read an integer value from the user, compute the square root and cube root of the value and then print the results in a prescribed format. But, it contains several run-time errors, both exceptions and logic errors. Remember that $x^{1/2} = \sqrt{x}$ and $x^{1/3} = \sqrt[3]{x}$.

📝 You are to find and correct all of the errors in the program. A correct version of the program should produce the following user interaction (prompt and output).

```
Enter an integer value: 47

x = 47
square root(x) = 6.855654600401044
cube root(x)   = 3.6088260801386944
```

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* Based on the labs of Dr. Rance Necaise

Note the empty line before the output is printed. This is required as part of the output. When you have found and corrected all of the errors and the program runs correctly, be sure the file is saved.

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User Input

The main purpose of most computer programs is to process data. The data used by a program can be specified within the program (literal values), extracted from a data file, or entered by a user via the keyboard. In a text based program (one without a GUI), data is commonly extracted (read) via the keyboard within a terminal window. This is commonly referred to as *standard input.*

In the previous lab, you completed the `cylinder.py` program that computed the volume, surface area, and circumference of a cylinder given its height and radius. In that program, the height and radius were specified in the program, but that makes the program less than ideal. If a user wanted to use different values, the user would have to know how to program using Python and edit the program to include the new values. A better approach is to read the input values from the user via standard input.

Load the `cylinder2.py` source file from your `U:\cs111\lab2` folder into the *Wing* IDE. This is a fully functioning and correct version of the program that you completed in the last lab.

You are to modify this program to read the cylinder data from the user via standard input. Modify the program as follows:

- Add your name and date to the file prolog to indicate that you modified the source file.

- Remove the variable initializations for the `height` and `radius` variables. Remember, these were assigned values in the previous program since we were not using user input.

- Add the necessary statements to prompt the user to enter appropriate data and to read that data from the keyboard. The prompt should be meaningful for this particular program. Note that the radius and height of a cylinder can be any real value.

- Include a descriptive comment before the group of new statements.

Run your program and correct any syntax and run-time errors that you may encounter. Once the program is correct, run the program and enter values at the prompt. Verify the results displayed to the terminal are correct.

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First Complete Program

You are now ready to write your first complete program from scratch. To get started,

⚠ Create a new empty text file by selecting the "New" option from the "File" menu or from the tool bar at the top.

📝 You are to write a program that will compute and display the perimeter and diagonal length for a sheet of paper, the size of which will be entered by the user. The algorithm required to solve this problem is provided below:

1. Prompt and extract from the user the width and height of a sheet of paper in inches.

2. Compute the perimeter and diagonal length for the sheet of paper.

3. Display the results.

Your program must be written to the following specifications:

- You must use `paperSize.py` as the name of your program.

- Include a file prolog that includes the name of the file, your name, today's date and a brief description indicating the purpose of the program.

- Include descriptive comments for each step or block of code.

- Use meaningful prompts and assume both values can be real numbers.

- You may assume the user will enter numerical values for the input.

- *Hint:* the diagonal is the hypotenuse of a right triangle.

- The output should be printed in the following format:

    ```
    Paper size:   8.0 x 11.5
       perimeter: 39.0
       diagonal:  14.0089257261219
    ```

  where the capital `P` in `Paper` is at the left edge of the output terminal. This output assumes the user entered 8 for the width and 11.5 for the height of the paper. Be sure to include the 3 spaces before the last two lines of output, and that the perimeter and diagonal length values are left aligned to the same column as shown.

- Leave a blank line before the first line of output.

You should fully verify that your program works correctly by testing multiple values. After completing the program, be sure the file is saved.

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Finishing Up

When you are finished with the lab, you need to show me that your code runs and correctly computes the solution for each part of the lab. Also, you need to submit the source files for grading. To submit the files, find the lab assignment on Canvas and upload the three files:

- `roots.py`
- `cylinder2.py`
- `paperSize.py`