Introduction to Computer Science and Programming 1
CSCI120

Chapter5: Iteration

Chapter5-Lab

Requirements

- For each of the problem below write a Python program.
- When defining variable names, use proper and meaningful names for the variables.
- Follow Python's convention for naming your variables (camel case)
- Remember Python is sensitive about indentation. Use proper indentation.
- Add comments to your code.
- Refer to lecture notes 2,3 and 4 if you need any help.
- Write all the python programs in one single file. Separate your answers for each question as following: Example:

```
##Problem 1
print("Problem1-------------------------------------------")
Python code for problem 1


##Problem 2
print("Problem2-------------------------------------------")
Python code for problem 2
```

Problem1

- Write a Python program that allow the user to enter the information about 3 types of shapes: 1- Square, 2-Rectangle, 3-Circle. The program prompts the user to enter the type of the shape first, and then depending on the type of shape, the program with ask for the information. For instance, if the user entered "Circle", the program asks for the radius of the Circle and similarly for Squares and Rectangles. The user can terminate the program by entering the word "completed". The program should find the following:
  - Total sum of the areas of the entered shapes.
  - Average area of the entered shape.
  - Shape with the minimum area (finds only one if there are more)
  - Shape with the maximum area (finds only one if there are more)

Problem2

- The program receives a statement which contains only alphabet variables and binary operations including +, -, *, / and % and check whether the statement is a valid arithmetic statement or not.

    - The statement might contain parenthesis as well. For instance:
        - a+b*a+c/c%y
        - (a+b)*(a/d-(a/b))

    - You can make this assumption that the variable names contain only one alphabet (like a, b, c) and cannot have more than one alphabets (like ab, temp, sum, …)
    - Remember from the lecture that 2 conditions should be satisfied in order an arithmetic operation is considered valid. Search in your lecture notes for it if you don't remember it.

Problem3

- The program keeps asking the user to enter numbers (positive or negative) until the user enters an invalid input. (An invalid input is an input which includes at least one alphabet, like 123d4). The program should find and print the Max and Min of the numbers the user had entered as well as the distance between the Max and Min. (Remember to calculate the absolute distance).

Problem4

- Consider two following mathematical functions:
- $F_1(x) = 2^x$
- $F_2(x) = x^5$
- ^ means exponent. Example: $2^3 = 2*2*2 = 8$

The program should find the positive number (and greater than 2), (let's call is T) which has the following characteristic:
- For all numbers which are less than T we have $F_1(x) < F_2(x)$
- For all numbers which are less than 100 and greater than or equal T we have $F_1(x) > F_2(x)$

Good Luck ☺