Programming and Data Structures 2025
Exercise 4
Python Basics

Overview

The purpose of this laboratory exercise is to introduce you to the Python programming language. You will implement five short programming assignments in Python.

Assignment

1. **Input and output**
   Write a program where the user enters one integer, a and one float b. The program then calculates √a and b^a and outputs the results to the output console

   Input:
   ```
   2
   2.5
   ```
   Output:
   ```
   1.414213
   6.25
   ```

2. **Characters**
   Write a program which reads a sequence of characters (one at a time) until a '?' is entered. Then print the number of capital letters (A-Z).

   Input:
   ```
   P
   y
   T
   h
   O
   n
   ```
   Output:
   ```
   3
   ```

3. **Strings and Arrays**
   Write a program where the input are five strings, which the program adds to an array. The program prints these strings sorted alphabetically on the screen.

   Input:
   ```
   lorem
   ipsum
   dolor
   sit
   amet
   ```
   Output:
   ```
   amet
   dolor
   ipsum
   lorem
   sit
   ```

4. **Random numbers**
   Write a program which generates two "dice rolls" and adds them. The program will perform a frequency analysis of the results. The program rolls the dice 100 times and each time calculates the sum of the two rolls. Use an array to store how many times the program rolled each sum.

When 100 dice rolls have been made, the program outputs how many times each possible result (2-12) was rolled. The dice roll is simulated by generating a random number between 1 and 6.

Input:

Output (example):

```
3 times the sum was 2
10 times the sum was 3
11 times the sum was 4
(etc until the last sum (12))
```

5. Classes

a) Create the class `Circle` and within it the following:

- A private attribute radius
- A constructor which takes radius parameter
- A method which returns the radius `getRadius()`
- A method which sets the radius to a new value `setRadius()`
- A method which calculates and returns the *area*
- A method which calculates and returns the *circumference*

b) Create a main class and within it write a main method which:

- Creates a `Circle` object,
- lets the user enter its radius, and
- prints the area and circumference.

All methods should be instance methods

Input:

```
3
```

Output:

```
Area: 28.2743
Circ: 18.8496
```

Demonstration

The assignments must be demonstrated for a lab supervisor (TA)

Report

No report required