CIS 103: Fundamentals of Programming

Lab 1: Python Loops and Object Types

Due Date: 09/21/2024 @ 11:59pm

Objective:

The purpose of this lab is to practice and reinforce Python programming concepts related to loops (while, for, nested loops), string operations, lists, tuples, and dictionaries.

Lab Instructions:

- Complete each of the exercises below.
- Write and test your code in Python.
- Make sure to follow best practices for coding (e.g., commenting, proper variable names, etc.).
- Submit your Python scripts via Brightspace and/or your GitHub repo.

Part 1: Looping Constructs

- **While Loop**: Write a Python program that prints the numbers from 1 to 10 using a `while` loop, but exits the loop when the number reaches 7.
    - **Hint**: Use the `break` statement.
- **For Loop**: Write a Python program that iterates over the string `"CIS103Lab3"` and prints each character, one by one, followed by its index in the string.
- **Nested Loop**: Write a Python program that uses nested loops to generate the following pattern:

    ```
    *
    **
    ***
    ****
    *****
    ```

- **Break and Continue**: Modify the program from Exercise 1. This time, use the `continue` statement to skip the number 5, but the program should still print numbers from 1 to 10, breaking at 7.

Part 2: Strings and List Operations

- **String Reversal**: Write a Python function that takes a string and returns the string reversed. Test it with the string `"Lab3Python"`. **Hint**: Use slicing.
- **List Operations**: Write a Python program to:

- Create a list of 5 integers of your choice.
- Add a new integer to the list.
- Remove the third element from the list.
- Sort the list in descending order.
- Print the final list.

Part 3: Tuples and Dictionaries

- **Tuple Operations**:
  - Create a tuple with the elements `(4, 5, 6, 7, 8)`.
  - Print the first and last elements of the tuple.
  - Attempt to change the second element of the tuple and note what happens.
- **Dictionary Operations:** Write a Python program that:
  - Creates a dictionary with the following key-value pairs:
    - 'name': 'Alice', 'age': 22, 'major': 'Computer Science'
    - Adds a new key-value pair for the student's GPA
    - Modifies the student's age to 23
    - Removes the 'major' key from the dictionary
    - Prints all the keys and values from the dictionary

Part 4: Take Home

1. Write a program that takes the radius of a sphere (a floating-point number) as input and outputs the sphere's diameter, circumference, surface area, and volume.

2. Statisticians would like to have a set of functions to compute the median and mode of a list of numbers. The median is the number that would appear at the midpoint of a list if it were sorted. The mode is the number that appears most frequently in the list. Define these functions in a module named stats.py. Also include a function named **mean** , which computes the average of a set of numbers. Each function expects a list of numbers as an argument and returns a single number.

Part 4: Submission

- Write your code for each exercise in a separate Python script (e.g., `exercise1.py`, `exercise2.py`, etc.).
- Test your code and ensure it works correctly.
- Submit your files in a zipped folder named `Lab3_YourName.zip` and make sure to upload your code to your GitHub account before the lab deadline.

Grading Criteria:

- Each exercise will be graded for correctness, code clarity, and proper use of Python constructs.

- Make sure your code is well-documented with comments explaining each part of the process.