Task: Create and Manipulate Data Structures in Python

Objective:

Practice creating and manipulating lists, sets, tuples, and dictionaries in Python.

Instructions:

1. **Lists:**
   - Create a list named `my_list` containing the following elements: `1, 2, 3, 'a', 'b', 'c'`.
   - Add the element `'d'` to the end of the list.
   - Remove the element `2` from the list.
   - Print the length of the list.
   - Print the list.
2. **Tuples:**
   - Create a tuple named `my_tuple` with the following elements: `10, 20, 30, 40, 50`.
   - Access and print the second element of the tuple.
   - Try to change the third element of the tuple to `35` (expect an error since tuples are immutable).
   - Print the entire tuple.
3. **Sets:**
   - Create a set named `my_set` containing the elements: `1, 2, 2, 3, 4, 4, 5`.
   - Add the element `6` to the set.
   - Remove the element `3` from the set.
   - Print all elements of the set.
   - Check if the element `4` is in the set and print the result.
4. **Dictionaries:**
   - Create a dictionary named `my_dict` with the following key-value pairs: `'name': 'John', 'age': 25, 'city': 'New York'`.
   - Add a new key-value pair `'job': 'Engineer'` to the dictionary.
   - Update the value of the `'age'` key to `26`.
   - Remove the `'city'` key from the dictionary.
   - Print all keys of the dictionary.
   - Print all values of the dictionary.
   - Print the entire dictionary.

Practice Question 1:

1. Check for palindrome
    True if “aca” or “aabbaa”
    False if “abbbb” or “baabbb”
2. Area of Circle
    Hint: Input radius and calculate area of circle formula: 3.14 * r * r
3. Check for prime number
4. Fibonacci Sequence
    Hint: Input max number (20) to print sequence
        Eg: 21
            0 + 1 + 1+ 2 +3 +5 +8 +13 = 33
5. Simple Interest Calculator
    Hint: formula i = (p * t * r) / 100
6. Print Multiplication table
    Hint: print up to 10 multiplication table of the input number
7. Check Leap year
    1888, 2012, 2016 are known to be leap years as it's completely divisible by 4.
8. Count Vowel in a string
9. Find LCM of two numbers
10. Find the area of different shapes like: Rectangle, Circle, Triangle, Square,
    Hint: Use Class and Inheritance

Create a virtual class having more than 300 students. Each student needs to give a 10 subjects exam. After the marks are found for each student, Find the topper and the lowest score student by using operator overloading.

Task: Use Python Loops to Perform Basic Operations

Objective:

Learn to use Python `for` and `while` loops to iterate over sequences and perform basic operations.

Instructions:

1. **For Loop:**
    - Create a list named `numbers` containing the numbers `1` through `10`.
    - Use a `for` loop to iterate over the list and print each number.
    - Use a `for` loop to calculate the sum of all numbers in the list and print the result.
2. **While Loop:**
    - Initialize a variable `counter` to `1`.
    - Use a `while` loop to print the value of `counter` as long as `counter` is less than or equal to `10`.
    - Inside the loop, increment the value of `counter` by `1`.
3. **Looping Over a String:**
    - Create a string named `message` with the value `"Hello, World!"`.
    - Use a `for` loop to iterate over each character in the string and print it.
4. **Nested Loop:**
    - Create a list of lists named `matrix` with the following elements: `[[1, 2, 3], [4, 5, 6], [7, 8, 9]]`.
    - Use a nested `for` loop to iterate over each row and each element within the row to print each element of the matrix.

Task: Creating and Using Functions in Python

Objective:

Understand how to define and use basic functions in Python.

Instructions:

1. **Define a Function to Calculate the Maximum of Three Numbers:**
    - Create a function named `max_of_three` that takes three numbers as arguments.
    - The function should return the maximum of the three numbers.
2. **Define a Function to Check if a Number is Prime:**
    - Create a function named `is_prime` that takes an integer as an argument.
    - The function should return `True` if the number is prime and `False` otherwise.
3. **Define a Function to Generate Fibonacci Sequence:**
    - Create a function named `fibonacci` that takes an integer `n` as an argument.
    - The function should return a list containing the first `n` numbers of the Fibonacci sequence.
4. **Define a Function to Count Vowels in a String:**
    - Create a function named `count_vowels` that takes a string as an argument.
    - The function should return the number of vowels (a, e, i, o, u) in the string.