Lab Work #02

CPL102: Object-Oriented Programming

SS2024

These exercises will cover the concept of flow controls (if-else, loops and switch), array, and methods.

1. Complete the Java program that prompts the user to select the choices for basic calculations. This task has the following functions:
    a. Choices are Addition, Subtraction, Multiplication, Division, and Modulus (you are free to add if you have more methods).
    b. Use loop to keep the choices continuously without terminating your programme unless user enters the exit option.
    c. Get the user input for the calculation to make useable for any kind of numbers.
    d. Display the clear messages for both inputs and outputs.
2. Write a Java program to prompt the user for a number between 1 and 10 (inclusive). If the user enters a number outside of this range, the program should display an error message and ask the user to enter a valid number again. Once a valid number is entered, the program should use a loop to display the multiplication table for that number from 1 to 10.

    Here's an example output:

```
Enter a number between 1 and 10: 12
Error: Invalid input. Please enter a number between 1 and 10.

Enter a number between 1 and 10: 7
Multiplication table for 7:
7 x 1 = 7
7 x 2 = 14
7 x 3 = 21
7 x 4 = 28
7 x 5 = 35
7 x 6 = 42
7 x 7 = 49
7 x 8 = 56
7 x 9 = 63
7 x 10 = 70
```

3. Write a Java program that asks the user to enter any number and then prints out whether the number is odd or even. And also, check whether the number is prime number or not. Define two methods to solve the problems.

4. Write a Java method called *calculateBMI* that calculates a person's body mass index (BMI). The method should take two parameters: a person's weight in kilograms and their height in meters. The formula for calculating BMI is *weight / (height * height)*. The method should return the calculated BMI as a double.
5. Write a Java method called *reverseString* that takes a string as input and returns the string in reverse order. For example, if the input is "hello", the method should return "olleh". You are not allowed to use in-build methods from StringBuilder class.
6. Write a Java program that creates an array of integers and finds the ***max, min*** and ***sum*** of all the elements in the array by using the methods. The program should first ask the user to enter the size of the array, and then ask the user to enter the values of each element. The program should then compute to find the max, min and sum of all the elements and print it out.
7. Write a Java program that creates an array of strings and sorts the array in alphabetical order. The program should first ask the user to enter the size of the array, and then ask the user to enter the values of each element. The program should then sort the array in alphabetical order and print out the sorted array.
8. Write a Java program that creates a 2D array of integers and finds the sum of all the diagonal elements in the array. The program should first ask the user to enter the number of rows and columns for the array, and then ask the user to enter the values of each element. The program should then compute the sum of all the diagonal elements and print it out. Keep the size of rows and columns same, and there will be two results for two diagonals.
9. Write a Java program that creates a 2D array of characters and counts the number of vowels in the array. The program should first ask the user to enter the number of rows and columns for the array, and then ask the user to enter the values of each element. The program should then count the number of vowels in the array and print it out with their position.