National University of Computer and Emerging Sciences

Lab Manual # 6b

Programming Fundamentals Lab

Course Instructor	Ms. Maham Naeem
Lab Instructor(s)	Ms. Kissa Tanvir Ms. Sana Ejaz
Section	BCS-1K
Semester	Fall 2023

Department of Computer Science

FAST-NU, Lahore, Pakistan

Objectives:
> In this lab, students will practice:

- Conditional structure
- While loop

- For loop
- Nested loops

Questions:

1. Print the square roots of the first 25 odd positive integers.

2. Write a program that inputs a number from the user and displays its factorial. It asks the user whether user wants to calculate another factorial or not. If the users inputs 1, it again inputs number and calculate another factorial. If the user inputs 0, the program terminates.

3. Write a program that gets two numbers from the user and displays the result of first number raised to the power of second number using do-while loop.

```
Enter the base number: 3
Enter the exponent: 5
The result is: 243
```

4. Write a program that inputs table number and length of table and then displays the table using for loop.

```
Enter the table number: 5
Enter the length of the table: 12
5 x 1 = 5
5 x 2 = 10
5 x 3 = 15
5 x 4 = 20
5 x 5 = 25
5 x 6 = 30
5 x 7 = 35
5 x 8 = 40
5 x 9 = 45
5 x 10 = 50
5 x 11 = 55
5 x 12 = 60
```

5. Write a program that calculates the occupancy rate for a hotel. The program should start by asking the user how many floors the hotel has. A loop should then iterate once for each floor. In each iteration, the loop should ask the user for the number of rooms on the floor and how many of them are occupied. After all the iterations, the program should display how many rooms the hotel has, how many of them are occupied, how many are unoccupied, and the percentage of rooms that are occupied. The percentage may be calculated by dividing the number of rooms occupied by the number of rooms.

6. Write a program that displays the following using do-while loop. **Ask user for starting and ending point.**

    4 4 4 4
    3 3 3
    2 2
    1

7. Write a program that finds the sum of the squares of integers from 1 to n. Where n is a positive value entered by the user, also display the series.
    i.e., $1^2 + 2^2 + 3^2 + \ldots\ldots + n^2$.

    ```
    Enter a positive integer n: 10
    1^2 + 2^2 + 3^2 + 4^2 + 5^2 + 6^2 + 7^2 + 8^2 + 9^2 + 10^2 = 385
    ```

8. Write a program to calculate and display the sum of the following series using for loop, N must be provided by user.

    $$\frac{1}{2} + \frac{1}{4} + \frac{1}{6} + \frac{1}{8} + \frac{1}{10} + \frac{1}{12} + \frac{1}{14} + \frac{1}{16} + \ldots + \frac{1}{N}$$

    ```
    Enter a positive integer N: 10
    Series: 1/2 + 1/4 + 1/6 + 1/8 + 1/10 + 1/12 + 1/14 + 1/16 + 1/18 + 1/20
    Sum = 1.46448
    ```

9.

- Describe the output produced by these `while` loops:

```
a) int K = 5;
   int I = -2;
   while (I <= K) {
       I = I + 2;
       --K;  // same as:  K = K - 1;
       cout << (I + K) << endl;
   }

b) int number = 4;
   while (number >= 0)
       --number;  // same as:  number = number - 1;
       cout << number << endl;
```