# National University of Computer and Emerging Sciences, Lahore Campus

| Lab No 4 | | | |
|---|---|---|---|
| Course Name: | Programming Fundamentals | Course Code: | CS 188 |
| Program: | BS(SE) | Semester: | Fall 2020 |
| Duration: | 2.5 hours | Total Points: | 10 + 20 + 10 + 20 |
| Lab Date: | Saturday, October 24, 2020 | Weight | 5% |
| Section: | SE-1A and SE-1B | Page(s): | |

**Instruction/Notes:** **Cheating during the lab will result in negative marks**

**Topics Covered:** Loops

You might use any IDE available at your computer or use one of the online IDE available at http://cpp.sh/, https://www.codechef.com/ide, https://ideone.com/, https://www.onlinegdb.com/

**Problem No 1:**

Write a program that input a number **n** and then input n numbers $a_1, a_2, a_3, \ldots, a_n$. The program must determine and show the sum and average of the numbers entered by the user.

| Sample Input | Sample Output |
|---|---|
| 5<br>10 20 30 40 50 | **Sum = 150**<br>**Average = 30** |

**Restrictions:**

- **You are not allowed to use more than four variables in your program.**

**Problem No 2:**

Write a program that inputs a sequence of non-negative numbers terminated by a negative value and show the sum, average, maximum and minimum of the non-negative numbers.

| Sample Input | Sample Output |
|---|---|
| 10 20 30 40 50 -10 | **Sum = 150**<br>**Average = 30**<br>**Maximum = 50**<br>**Minimum = 10** |
| 13 2 15 5 30 -10 | **Sum = 65**<br>**Average = 13**<br>**Maximum = 30**<br>**Minimum = 2** |

**Restrictions:**

- **You are not allowed to use more than seven variables in your program.**

**Problem No 3:**

A staircase pattern of size ***n = 4*** is given on the right.


Its base and height are both equal to ***4*** and it is drawn using # symbols.

Write a function that takes an integer argument n and prints a staircase of size ***n*** where n is specified by the user.

The function will have the following form

```
void staircase(int n) {
// Your code will be written inside this function.

}
```

Call your function from the main function to print staircase pattern of size n specified by the user.

| Sample Input | Sample Output |
|---|---|
| 4 | #<br>##<br>###<br>#### |

**Problem No 4:**

A sequence of **n** numbers $a_1, a_2, a_3, \ldots, a_n$ is said to be strictly increasing if $a_1 < a_2 < a_3 < \ldots < a_n$ and strictly decreasing if $a_1 > a_2 > a_3 > \ldots > a_n$.

So a sequence is strictly increasing if each term in the sequence is larger than the preceding term and strictly decreasing if each term of the sequence is smaller than the preceding term.

Write a program that reads **n,** i.e. number of terms in the sequence, and n numbers $a_1, a_2, a_3, \ldots, a_n$. The program must determine and show if the numbers entered by the user form an increasing sequence, decreasing sequence or neither.

| Sample Input | Sample Output |
|---|---|
| 5<br>1 2 3 4 5 | **Strictly Increasing** |
| 3<br>3 2 1 | **Strictly Decreasing** |
| 4<br>1 2 4 3 | **Neither** |

**Restrictions:**

- **You are not allowed to use more than five variables in your program.**
- **All numbers entered by users are integers.**
- **User will only enter the numbers once**