Lab Assignment 1

Object Oriented Programming (IT620)

Date: 19/01/26

Instructions:

- This lab is a prerequisite warm-up for Object Oriented Programming.

- Students may use **Python or C++**.

- Write clean, readable, and modular code.

- Avoid using built-in shortcuts unless explicitly required.

Questions:

1. Given an array of integers of size N, compute the following:

   - The sum of all elements
   - The maximum element
   - The count of even numbers

2. Write a program to reverse a stack **without using the reverse()** function.

   Example:
   Input: `stack = [3, 7, 2]`
   Output: `stack = [2, 7, 3]`

3. Write a program from scratch to generate **all permutations** of a list (do not use built-in permutation libraries such as `itertools`).

   Example:
   Input: `[1, 2, 3]`
   Output: `[(1,2,3), (1,3,2), (2,1,3), (2,3,1), (3,1,2), (3,2,1)]`

4. Check whether a given array is a **mountain array**, i.e., it is strictly increasing up to a peak and strictly decreasing after the peak. Print the peak element if it exists.

   Example:
   Input: `[2, 5, 9, 12, 8, 4, 1]`
   Output: `Valid Mountain, Peak = 12`

5. Count the frequency of each character in a given string and store the result in a dictionary (or map).

   Example:
   Input: ``adcbbdaacd''
   Output: {'a': 3, 'b': 2, 'c': 2, 'd': 3}

6. Write a function to find the N largest and N smallest elements from a list.

   Example:
   Input: $N = 3$,
   ```
   Arr = [13, 29, 26, 15, 4, 70, 89, 57, 34, 66, 10, 49]
   ```

   Output:
   ```
   Largest = [89, 70, 66]
   Smallest = [4, 10, 13]
   ```