National University of Computer and Emerging Sciences

Lab Manual # 02
Object oriented programming
(Section BSE-2B)

Course Instructor	Ms. Arooj Khalil
Lab Instructor(s)	Mamoona Akbar Saleha Batool
Semester	Spring 2023

Department of Computer Science

FAST-NU, Lahore, Pakistan

Objectives:

After performing this lab, students shall be able to:
Dynamically allocate and deallocate memory.
Create and manipulate dynamic 1D and 2D arrays.

Question no 1:

Take size input from the user and create an array of that size. Now populate the array as well by taking input from the user.

- First Implement **void copyArray(int* arr, int *&arr1, int size)** that copies arr into arr1.
- Now implement another function **int reduceArray(int *arr, int *&arr1, int size)** that asks user to enter size to reduce the array. To reduce the array, remove the elements of the arr from the start and copy remaining into arr1. Use **copyArray** function to copy.

Example

```
Input:
Please enter size: 8
Please enter elements: 91
5
3
40
7
8
12
642
Please enter the reduced size of array: 5

Output:
Array after reduction is: 40
7
8
12
642
```

Question no 2:

Write a C++ program that keeps taking integer input from the user until user enters -1 and displays the data in reverse order.

Your program should save the input in a dynamically allocated array. Initially create a dynamic array of five integers. Each time the array gets filled your program should double the size of array and continue taking the input. After receiving **-1** (i.e. end of data input) your program should print the integers in the reverse order as entered by the user.

You have to make use of the following functions for this task:

- **void Input (int * & iarr, int & size);** //why is size passed by reference for this?

- **void reverse (int * iarr, int size);**
- **void Output (int * iarr, int size);**

Question no 3:

Write a function StringConcat(char * string1, char * string2) that concatenate string1 and string 2 and store their result in string1. If the array holding the first string1 isn't large enough to hold both strings, this function will overflow the boundaries of the array. Make sure that the concatenated string fits perfectly in string1 and no extra space is used.

Example:

Input:

String1: Hello Class.

String2: Programming Fundamentals.

Output:

String1 after concatenation is:

Hello Class Programming Fundamentals.

Question no 4:

Write a program that inputs the number of rows and columns from the user. It then inputs the elements to store in the matrix. The program calculates the sum of each row and each column and displays on the screen. If it is square matrix. It also calculates the sum of diagonal elements and displays it on screen.

Example:

```
Enter number of rows and columns in matrix:
3 3
Enter elements of matrix:
9 8 7 6 5 4 3 2 1
Row sum and column sum:
9    8    7   24
6    5    4   15
3    2    1    6
18   15   12
```

Question no 5:

Given 3 sets of integer A, B and C with equal length; you are required to compute A∩B, B∩C and C∩A. The intersection results should be stored in a 2d integer array such that A∩B is in row 0, B∩C is in row 1, and C∩A is in row2 of the resultant array.

Keeping in mind that the intersection results might vary in lengths, you have to make sure that no row should have any empty cell

You'll have to do the following jobs in functions:

1- Input the three integer Sets.

2- Calculate Intersection and return the resultant array.

3- Output the resultant 2d array.

Example:

A={1,2,3,4,5,6,7,8,9,10}

B={1,2,5,6,9,10,13,14,18,20}

C={2,4,6,8,10,11,13,15,17,19}

Resultant array:

1	2	5	6	9	10
2	6	10	13		
2	4	6	8	10	