## CL-2001
## Data Structures
## Home Work-01

**Objectives:**
- Arrays and Pointers Operations
- String matching
- Regex

# Deadline: 15-Sep-2022

**Note: Carefully read the following instructions (*Each instruction contains a weightage*)**

1. There must be a block of comments at start of every question's code by students; the block should contain brief description about functionality of code.
2. Comment on every function and about its functionality.
3. Mention comments where necessary such as comments with variables, loop, classes etc to increase code understandability.
4. Use understandable name of variables.
5. Proper indentation of code is essential.
6. Write a code in C# language.
7. First think about statement problems and then write/draw your logic on copy.
8. After copy pencil work, code the problem statement on MS Studio C# compiler.
9. At the end when you done your tasks, attached C# created files in MS word file and make your submission on Google Classroom. (Make sure your submission is completed).
10. Please submit your file in this format **19F1234_L4**.

## Submission:

11. **Make a Microsoft Word file and paste all of your C# code with all possible screenshots of every task output in Microsoft Word and submit word file.  submit all .cpp file.**
12. **There will a viva of it after due date.**

13. **Do not submit your assignment after deadline. Late and email submission is not accepted.**
14. **Do not copy code from any source otherwise you will be penalized with Zero (0) marks.**

## Problem: 1|Arrays [2 wtg]

Assume a 2D array **(input)** of size 6 X 6. Consider another matrix **(output)** of size 6 X 6.

Each element $i$ of output computed as:

$$Output_i = \frac{1}{input_i} \sum_{j \in \{all\ neighbors\ of\ i\}} input_j$$

Each calculations in the output showing $\frac{1+1+1}{2} = 1.5$, $\frac{1+2+1+2+1+1+1+1}{1} = 10$, $\frac{1+1+1+1+2}{1} = 6$ are shown below.

Write a c++ program to produce the output matrix given input matrix.

**input**

| 1 | 2 | 1 | 2 | 2 | 1 |
|---|---|---|---|---|---|
| 2 | 1 | 1 | 1 | 3 | 1 |
| 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | 1 | 1 | 2 | 1 | 1 |
| 1 | 1 | 2 | 1 | 1 | 1 |
| 2 | 1 | 2 | 1 | 1 | 2 |

**output**

| | | | | | |
|---|---|---|---|---|---|
| | 10 | | | | |
| | | | | | |
| | | | | | |
| | | | | | 6 |
| 1.5 | | | | | |

## Problem: 2|Pointers [ 0.5 wtg]

Ask user to enter the table number and its limit. Take this value using the pointers. And pass these pointers to a function and print the desire table using pointer. Repeat the program as long as the user doesn't enter sentinel value. **[Note make the use of pointers in each cin and cout]**

**Sample Execution**

```
Select D:\Anjum FAST Labs\DS Manuals\lab 13\test.exe
Enter   table Number: 3
Enter   table Limit: 9
3*1 = 3
3*2 = 6
3*3 = 9
3*4 = 12
3*5 = 15
3*6 = 18
3*7 = 21
3*8 = 24
3*9 = 27
```

**Problem: 3 | Arrays with File Handing [1.5 wtg]**

Create a text file and store integer data in it. You have to read the data from the text file and store it into two-dimensional array of 5x5, then calculate the row-wise sum of two dimensional which you read from the text file and store the sum in third one dimensional array.

**Problem: 4 | String matching and Regex [3 wtg]**

You are hired to work on input validation of an application.

   a. **Your 1st task is to write a C++ code for password validation. A valid password must satisfy following conditions:**
      1. Length of password should be more than 5 and less than 11
      2. Password must contain at least 1 digit, 1 uppercase Letter and 1 special character
   b. **Your 2nd task is to write a C++ code for email validation. A valid email must satisfy following conditions:**
      1. Email must have the given format "prefix@domain.com".
      2. Domain must be a valid domain (must match with any domain in domain dataset).
      3. 1st char of prefix must be an alphabet
      4. prefix can have only 3 special characters (- , . , _)
      5. 2 consecutive special characters in prefix are not allowed
      6. Last character of a prefix can not be a special character

**Note: Resource to solve this problem. (You can also see other resources as well).**

   1. **https://www.geeksforgeeks.org/regex-regular-expression-in-c/**

   2. **https://cplusplus.com/reference/regex/**

   3. **https://www.softwaretestinghelp.com/regex-in**

      **cpp/#:~:text=C%2B%2B%20Input%20Validation-**

      **,Regular%20Expression%20(regex)%20In%20C%2B%2B,also%20used%20for%**

      **20input%20validation.**

☺   Best of luck