NATIONAL UNIVERSITY
OF COMPUTER & EMERGING SCIENCES
PESHAWAR CAMPUS

Problem Set:	Assignment 04	**Semester**:	Fall 2022
Points:	-	**Due Date**:	See Classroom
Course:	CS1002 Programming Fundamentals	**Instructor**:	Shoaib M Khan

Note:

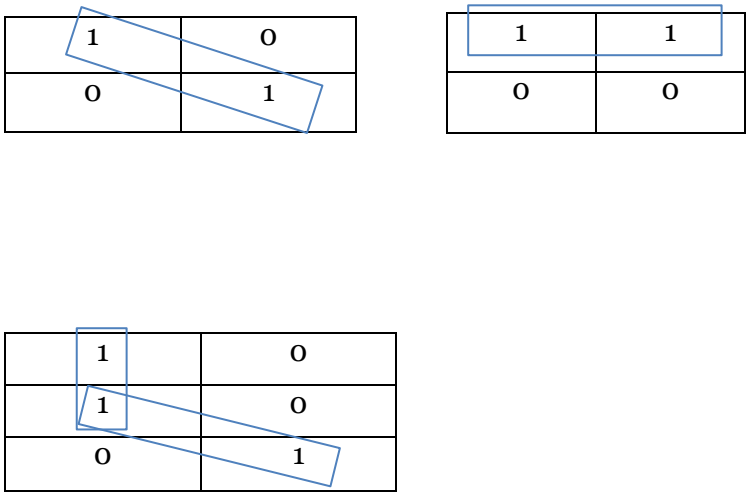
1. No Assignment will be accepted after the deadline.
2. Only submissions in Classroom are accepted
3. Submit only .c or .cpp file
4. Make sure your file compiles and run
5. Plagiarism will not be tolerated

Problem1:

Scenario:

Images are the 2D arrays. Different Number represents different colors and they make up the pixels on the screen. Suppose you have a 2D array with only two colors, black and white. White represented by 0 and Black represented by 1. Consider white a background and black foreground. Your task is to find how many connected components are there in the array.

Explanation:



These components are connected, and these images have 1 component.

Write a function which takes 2D array as parameter of fixed size 5 rows and 5 columns. For convenience, just solve the problem keeping in mind there won't be more than 5 connected components in any given input.

The algorithm for solving this problem is here. You can also try to solve it with different method.

OR

Problem2:

1. Create two 4 by 4 matrix and initialize it using random values, you can use inbuilt function of Pseudo Random Number Generator (PRNG).
2. Replace the main diagonal elements of the second matrix with the main diagonal elements of the first matrix.
3. Create a third matrix(output) while considering the second matrix as input such that:

Each element i of output computed as:

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

Consider the matrix to be of overlapping nature (both upsides down and sideways)
such that matrix [0][0] left neighbors will be matrix [0][3] and top neighbors will be matrix [3][0]

4. Afterwards create a function with return type bool that will check whether the third matrix is symmetric or not.
5. In the end print the first, second and third matrix respectively.