National University of Computer and Emerging Sciences



Lab Manual 09

Programming Fundamentals

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| Section | F |
| Semester | Fall 2020 |

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## Objectives

After performing this lab, students shall be able to:

* Have an improved problem-solving ability
* Design algorithm for basic problems
* Understanding of 2D arrays, function overloading, default function parameters

## Note: Implement generic logics.

### Write a program that has two 2D character arrays. One is of 5x5 and the other one is of 6x6. Initialize arrays with your values.

### Ask the user that which one he/she wants to use by taking the input as 5x5 or 6x6.

### Now check that if the rows of the array are palindrome or not. (A palindrome is a string which is same frontwards and backward i.e “civic”, “12321”).

### Check if the 5x5 array is subset of 6x6 or not. Show this result in output

Example:

Suppose the two arrays are as follows and user selects array of **5x5** as first array

1 2 1 2 1

C 1 4 m 9

C I v I c

1 0 k h 6

1 2 2 2 1

1 2 1 2 1 2

C 1 4 m 9 2

C I v I c 2

1 0 k h 6 2

1 2 2 2 1 2

2 3 8 0 7 9

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| **Sample Output:**  **Row 1: Palindrome**  **Row 2: Not a Palindrome**  **Row 3: Not a Palindrome**  **Row 4: Not a Palindrome**  **Row 5: Palindrome**  **5x5 matrix is subset of the 6x6 matrix** |

1. The Fibonacci numbers, commonly denoted Fₙ, form a sequence, called the Fibonacci sequence, such that each number is the sum of the two preceding ones, starting from 0 and 1. The **Fibonacci Sequence** is the **series** of **numbers**: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, ...

Write a program which has a 10x10 matrix and its indices are initialized by -1. Then ask the dimensions from the user:

**For example**

Enter dimension x: 4

Enter dimension y: 3

Now fill the 2D array with the Fibonacci series within the dimensions and show output. Implement this using function.

For example:

0 1 1 2 0 0 0 0 0 0

3 5 8 13 0 0 0 0 0 0

21 44 65 109 0 0 0 0 0 0

0 0 0 0 0 0 0 0 0 0

0 0 0 0 0 0 0 0 0 0

0 0 0 0 0 0 0 0 0 0

0 0 0 0 0 0 0 0 0 0

0 0 0 0 0 0 0 0 0 0

0 0 0 0 0 0 0 0 0 0

0 0 0 0 0 0 0 0 0 0

**Note:** If the user doesn’t enter dimensions within 10x10 range then use 10x10 as your default dimensions but in this case you aren’t allowed to pass any values to your function neither you can use global variables or static values (like i<10).

1. Let there be a square matrix, where each square is a rectangle, and a combination of more squares are also rectangles. Create a function that takes the order of the matrix as input and returns the number of rectangles in them.
2. A maze can be represented by a 2D matrix, where 0s represent **walkeable** areas, and 1s represent walls. You start on the upper left corner and the exit is on the lowest right cell. Create a function that returns true if you can walk from one end of the maze to the other. You can only move up, down, left and right. You **cannot move diagonally**.

**Note: Create a 6x6 matrix for this and fill values by yourself. Solve it generically.**

5. A password is considered **strong** if all the following conditions are met:

It has at least 8 characters and at most 20 characters.

It contains at least one lowercase letter, one uppercase letter and one digit.

It must NOT contain three repeating characters in a row (e.g. "...aaa..." is weak, but "...aa...a..." is strong, assuming other conditions are met).

Write a function that takes a string str and return the **MINIMUM** change required to make it a strong password. If it's already strong, return 0.

1. Write a program which you call a function sum and it returns the sum of three numbers. However, the types of the numbers can be all integers, all float, all doubles or any combination/order of integer, double or float. Numbers will be written as constants in function call.