

## Lab 08 Tasks

**Q1.** Take an integer  $n$  as input from the user.  $n \times n$  will be the dimension of the two-dimensional array that you have to create. The following example shows the array that you would have to create if  $n = 10$ .

1	1	1	1	1	1	1	1	1	1
1	2	2	2	2	2	2	2	2	1
1	3	4	4	4	4	4	4	3	1
1	5	7	8	8	8	8	7	5	1
1	8	13	15	16	16	15	13	8	1
1	14	23	29	31	31	29	23	14	1
1	24	43	54	60	60	54	43	24	1
1	44	78	103	114	114	103	78	44	1
1	79	147	192	217	217	192	147	79	1
1	1	1	1	1	1	1	1	1	1

Set all the boundary values as 1. Now start from index  $[1][1]$  and set the values by taking the sum of values stored at the upper-left and upper-right index positions. For example, the value at  $[1][1]$  will be  $[0][0] + [0][2]$ . Again, the value at  $[3][6]$  will be  $[2][5] + [2][7]$ .

**Q2.** Take an integer  $n$  as input from the user.  $n \times n$  will be the dimension of the two-dimensional array that you have to create. Now take the values to be stored in the array from the user. Assume that the array is a matrix and determine if the matrix is a diagonal matrix or not.

**Diagonal matrix.** A square matrix in which all of the elements are zero except for the diagonal elements i.e. a matrix of type

$$D = \begin{bmatrix} a_{11} & 0 & 0 & \cdots & 0 \\ 0 & a_{22} & 0 & \cdots & 0 \\ 0 & 0 & a_{33} & \cdots & 0 \\ \cdots & \cdots & \cdots & \cdots & \cdots \\ 0 & 0 & 0 & \cdots & a_{nn} \end{bmatrix}$$

When taking input for the matrix make sure it is possible to give the input in the following manner:

5 8 3

4 7 6

7 1 2

**Q3.** First take two integers  $a, b$  as input where  $a \times b$  will be the dimension of the matrix  $A$ . Now again take two integers  $x, y$  as input where  $x \times y$  will be the dimension of the matrix  $B$ . Now determine if the addition of matrix  $A$  and matrix  $B$  is possible. If possible, then print the result.

$$\begin{bmatrix} 1 & -4 & 5 \\ 2 & 0 & -8 \end{bmatrix} + \begin{bmatrix} -4 & -2 & 1 \\ 0 & 1 & 5 \end{bmatrix} = \begin{bmatrix} -3 & -6 & 6 \\ 2 & 1 & -3 \end{bmatrix}$$

$$\begin{bmatrix} 1 & -4 & 5 \\ 2 & 0 & -8 \end{bmatrix} - \begin{bmatrix} -4 & -2 & 1 \\ 0 & 1 & 5 \end{bmatrix} = \begin{bmatrix} 5 & -2 & 4 \\ 2 & -1 & -13 \end{bmatrix}$$

**Q4.** In a tic tac toe game, the player who succeeds in placing three of their marks in a horizontal, vertical, or diagonal row wins the game.



In this game, you will take 9 inputs. Input will be either 'X' or 'O'. It's assumed that the input is given in such a way that the game will always finish after taking 9 inputs. The first line contains the input of the first row, rest other lines are the inputs of the following rows. Now, you have to write a program to determine the winner. If player with 'X' wins, then print "**Player 1 wins**". If player with 'O' wins, then print "**Player 2 wins**". Otherwise print "**Draw**".

**Sample input:**

```
O X X
X O O
X O O
```

**Sample Output:**

Player 2 wins.