Data Structures Lab (CSC204) **Session: Monsoon 2021-22**
III BTech (CSE) **Date: 31.08.2021**

Assignment-3 (2D Array and Singly Linked List)

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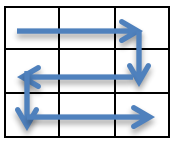
1. Aayush likes to jog every morning in a park. The park is divided in a square grid of size $(N \times N)(0 < N \leq 100)$. He goes to a park every day and runs across the park in a zig-zag manner as shown in the below figure. During the jogging, the time taken by him to cross each cell in the grid is given as a square matrix$(N \times N)$. Now, write a program to find the time consumed by Aayush to reach the target location as given by the coordinate value (x, y) in the park. Consider that he always starts from the top left corner of the park, i.e., at $(0,0)$ location.



Sample Input:

$N = 4$
$x = 1$
$y = 1$

1 3 4 10
2 5 9 11
6 8 12 15
7 13 14 16

Sample Output:

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2. You are given an image which is represented by $(N \times N)$ $(0 < N \leq 100)$ matrix. Write a program to rotate the image 90^0 in clockwise direction for K times. You must not use any extra storage.

Sample Input:

$N = 3$
$K = 5$

1 2 3
4 5 6
7 8 9

Sample Output:

7 4 1
8 5 2
9 6 3

3. Given two sparse matrices. Write a program to perform addition and multiplication operations on them and print the output.

Sample Input:

$Matrix1: N = 4$

Row	$Column$	$Value$
1	2	10
1	4	12
3	3	5
4	1	15
4	2	12

$Matrix2: N = 4$

Row	$Column$	$Value$
1	3	8
2	4	23
3	3	9
4	1	20
4	2	25

Sample Output:

$Result\ Of\ Addition$:

Row	$Column$	$Value$
1	2	10
1	3	8
1	4	12
2	4	23
3	3	14
4	1	35
4	2	37

$Result\ Of\ Multiplication$:

Row	$Column$	$Value$
1	1	240
1	2	300
1	4	230
3	3	45
4	3	120
4	4	276

4. You are given some integers in any order with the presence of duplicity. Write a program to perform the following tasks:

   (a) Write a function ***Create_list*** to create a singly linked list using all the given integers. This function takes the head of the linked list as an argument.

   (b) Write a function ***Display_list*** to print all the elements of the list. This function takes the head of the linked list as an argument.

   (c) Write a function ***Search_key*** to find a particular search element (given by the user) from the list and print its total number of appearance in the list. If the given search element is not present in the list then print an appropriate message. This function takes the head of the linked list and the search element as arguments. Note that the list should be traversed only once.

Sample Input:

$16 \rightarrow 10 \rightarrow 3 \rightarrow 10 \rightarrow 11 \rightarrow 10 \rightarrow 23 \rightarrow END$

$Search\ element = 10$

Sample Output:

$Total\ no.of\ appearance = 3$