Java - Introduction to Programming Lecture 11

2D Arrays In Java

It is similar to 2D matrices that we studied in 11th and 12th class.

a. Creating a 2D Array - with new keyword
int[][] marks = new int[3][3];

b. Taking a matrix as an input and printing its elements.

```
import java.util.*;
```

c. Searching for an element x in a matrix.

```
import java.util.
public class TwoDArrays {
  public static void main(String args[]) {
       Scanner sc = new Scanner(System.in);
       int rows = sc.nextInt();
       int cols = sc.nextInt();
       int[][] numbers = new int[rows][cols];
       //input
       //rows
       for(int i=0; i<rows; i++) {</pre>
           for(int j=0; j<cols; j++) {</pre>
               numbers[i][j] = sc.nextInt();
       int x = sc.nextInt();
       for(int i=0; i<rows; i++) {</pre>
           for(int j=0; j<cols; j++) {</pre>
               //compare with x
               if(numbers[i][j] == x) {
                    System.out.println("x found at location (" + i + ", " + j +
")");
```

Homework Problems

1. Print the spiral order matrix as output for a given matrix of numbers. [Difficult for Beginners]

For example: for the given matrix,



Spiral order is given by:

1 5 7 9 10 11 21 41 70 105 95 81 79 70 40 15 9 6 10 12 13 20 32 68 63 59 55 25 29 30 29.

APPROACH:

Algorithm: (We are given a 2D matrix of n X m).

- 1. We will need 4 variables:
 - a. row_start initialized with 0.
 - b. row_end initialized with n-1.
 - c. column_start initialized with O.
 - d. column_end initialized with m-1.
- 2. First of all, we will traverse in the row row_start from column_start

to column_end and we will increase the row_start with 1 as we have traversed the starting row.

- 3. Then we will traverse in the column column_end from row_start to row_end and decrease the column_end by 1.
- 4. Then we will traverse in the row row_end from column_end to column_start and decrease the row_end by 1.
- 5. Then we will traverse in the column column_start from row_end to row_start and increase the column_start by 1.
- 6. We will do the above steps from 2 to 5 until row_start <= row_end and column_start <= column_end.

```
Import java.util.*;
     Scanner sc = new Scanner(System.in);
     int m = sc.nextInt();
```

```
int rowEnd = n-1;
```

```
System.out.print(matrix[row][colStart] + " ");

}
colStart++;

System.out.println();
}
}
```

2. For a given matrix of N x M, print its transpose.

```
import java.util.*;

public class Arrays {

  public static void main(String args[]) {

    Scanner sc = new Scanner(System.in);

    int n = sc.nextInt();

    int m = sc.nextInt();

    int matrix[][] = new int[n][m];

    for(int i=0; i<n; i++) {

        for(int j=0; j<m; j++) {

            matrix[i][j] = sc.nextInt();

        }

    }
}</pre>
```

```
System.out.println("The transpose is : ");

//To print transpose

for(int j=0; j<m ;j++) {
    for(int i=0; i<n; i++) {
        System.out.print(matrix[i][j]+" ");
    }

    System.out.println();
}</pre>
```