1. Interchange the rows.

3 — n
3 — m
8 1 0 — 0
9 9 6 — 1
6 6 4 — 2

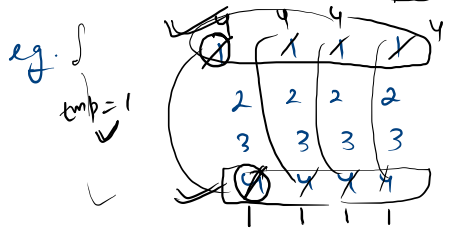
⇒

6 6 4
9 9 6
8 1 0

2 ways.
1D.

last (n-1)

eg.

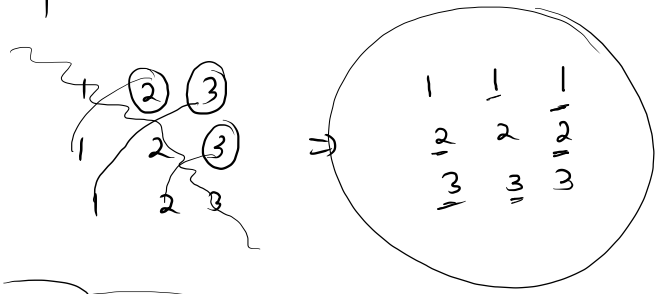


tmp = 1

⇒

4 4 4 4
2 2 2 2
3 3 3 3
1 1 1 1

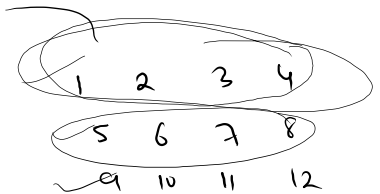
2. Transpose 2D Mat (n×n)



half of sq.

1D

3.



⇒

4 3 2 1
8 7 6 5
12 11 10 9

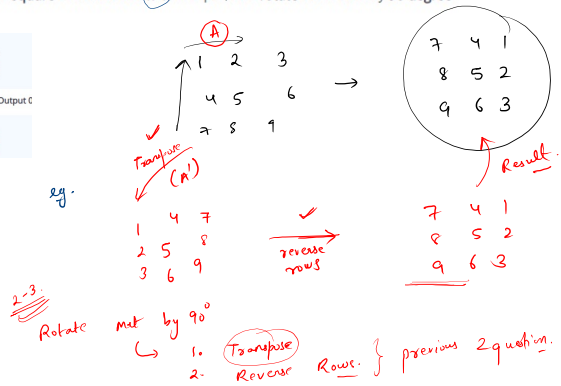
Rotate The Matrix by 90 Degree

Take a **square** matrix of size n*n as input, and **rotate** the matrix by **90 degree**.

```
3
1 2 3
4 5 6
7 8 9
```

Sample Output 0

```
7 4 1
8 5 2
9 6 3
```




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

public class Solution {
    public static void transpose(int [][] A){
        int n = A.length;
        for(int i = 0; i < n; i++){
            for(int j = i; j < n; j++){
                int tmp = A[i][j];
                A[i][j] = A[j][i];
                A[j][i] = tmp;

            }
        }
    }
    public static void reverseRows(int [][] A){
        int n = A.length;
        for(int row = 0; row < n; row++){
            int i = 0;
            int j = n-1;

            while(i < j){
                int tmp = A[row][i];
                A[row][i] = A[row][j];
                A[row][j] = tmp;
                i++;
                j--;
            }
        }
    }
    public static void printArr(int [][] A){
        int n = A.length;
        for(int i = 0; i < n; i++){
            for(int j = 0; j < n; j++){
                System.out.print(A[i][j] + "\t");
            }
             System.out.println();
        }
    }
```

```java
    public static void main(String[] args) {
        Scanner scn = new Scanner(System.in);
        int n = scn.nextInt();

        int [][] A = new int[n][n];
        for(int i = 0; i < n; i++){
            for(int j = 0; j < n; j++){
                A[i][j] = scn.nextInt();
            }
        }

        //1. transpose
        transpose(A);
        //2. reverse Rows
        reverseRows(A);
        //3. display
        printArr(A);
    }
```

Convert 1-D Array to 2-D Array

Take an **array** of size **N** as input, representing a 1-D array.

There are many possible factors of N, for eg:- **p * q = N**.

Now take **p and q** as input and print the 2-D array with dimensions as **p*q**.

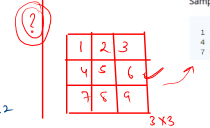
Note: It is **guaranteed** that a 2-D array will be formed.

Sample Input 1

```
6
1 2 3 4 5 6
2
3
```

Sample Output 1

```
1 2
3 4
5 6
```

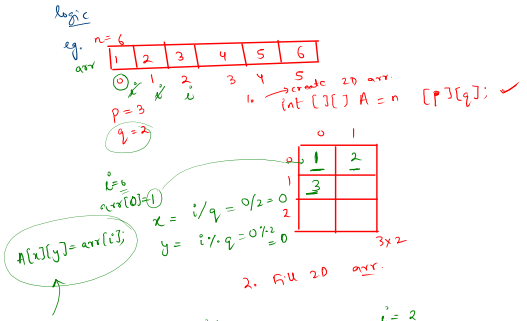


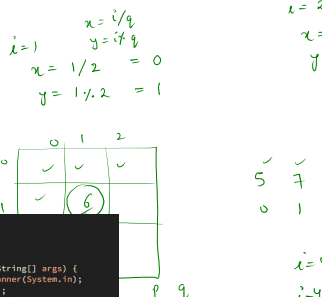
Sample Input 0

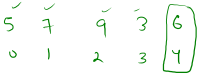
```
9
1 2 3 4 5 6 7 8 9
3 3
```

Sample Output 0

```
1 2 3
4 5 6
7 8 9
```





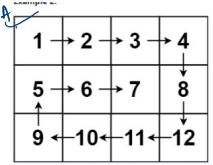



```java
import java.util.*;

public class Solution {

    public static void main(String[] args) {
        Scanner scn = new Scanner(System.in);
        int n = scn.nextInt();
        int [] arr = new int[n];
        for(int i = 0; i < n; i++){
            arr[i] = scn.nextInt();
        }
        int p = scn.nextInt();
        int q = scn.nextInt();

        //logic
        //1. create 2D array of size p * q
        int [][] A = new int[p][q];
        // Fill
        for(int i = 0; i < n; i++){
            int x = i / q;
            int y = i % q;

            A[x][y] = arr[i];
        }
        //print A
        for(int i = 0; i < p; i++){
            for(int j = 0; j < q; j++){
                System.out.print(A[i][j] + "\t");
            }
             System.out.println();
        }

    }
}
```

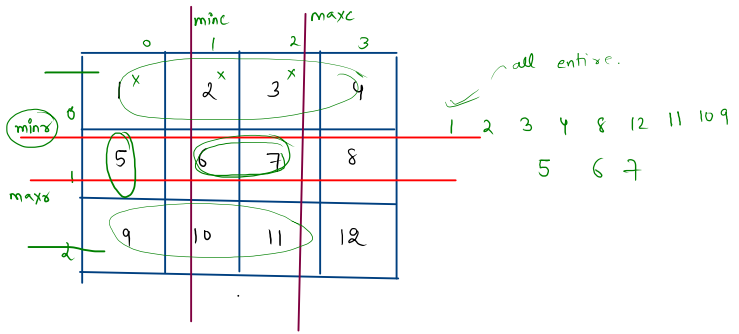
```java
public class Solution {
    public static void fill(int [][] A, int [] arr, int q){
        int n = arr.length;
        for(int i = 0; i < n; i++){
            int x = i / q;
            int y = i % q;

            A[x][y] = arr[i];
        }
    }

    public static void main(String[] args) {
        Scanner scn = new Scanner(System.in);
        int n = scn.nextInt();
        int [] arr = new int[n];
        for(int i = 0; i < n; i++){
            arr[i] = scn.nextInt();
        }
        int p = scn.nextInt();
        int q = scn.nextInt();

        //logic
        //1. create 2D array of size p * q
        int [][] A = new int[p][q];


        // Fill --> 2D array
        fill(A, arr, q);

        //print A
        for(int i = 0; i < p; i++){
            for(int j = 0; j < q; j++){
                System.out.print(A[i][j] + "\t");
            }
             System.out.println();
        }

    }
}
```

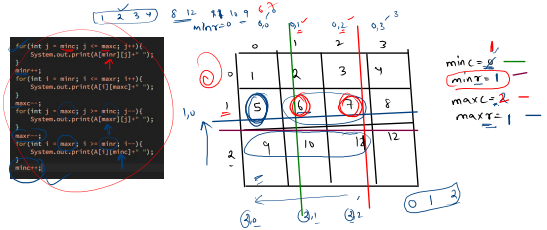
Spiral Matrix 44

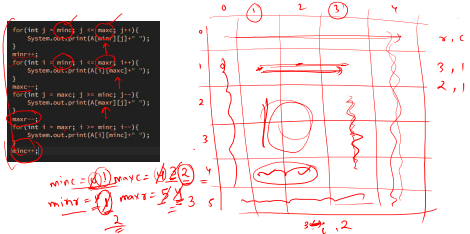
Print all the elements of a m*n matrix in the spiral form as shown below. Note: Start traversing from the – (0th row and 0th column)




```
Input: matrix = [[1,2,3,4],[5,6,7,8],[9,10,11,12]]
Output: [1,2,3,4,8,12,11,10,9,5,6,7]
```







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

public class Solution {

    public static void main(String[] args) {
        Scanner scn = new Scanner(System.in);
        int row = scn.nextInt();
        int col = scn.nextInt();

        int [][] A = new int[row][col];
        for(int i = 0; i < row; i++){
            for(int j = 0; j < col; j++){
                A[i][j] = scn.nextInt();
            }
        }
        // define 4 walls
        int minr = 0;
        int maxr = row - 1;

        int minc = 0;
        int maxc = col - 1;

        int total = row * col;
        int count  = 0;          // how many printed

        while(count < total){
            for(int j = minc; j <= maxc && count < total; j++){
                System.out.print(A[minr][j]+"   ");
                count++;
            }
            minr++;
            for(int i = minr; i <= maxr &&  count < total; i++){
                System.out.print(A[i][maxc]+"   ");
                count++;
            }
            maxc--;
            for(int j = maxc; j >= minc &&  count < total; j--){
                System.out.print(A[maxr][j]+"   ");
                count++;
            }
            maxr--;
            for(int i = maxr; i >= minr &&  count < total ; i--){
                System.out.print(A[i][minc]+"   ");
                count++;
            }
            minc++;
        }
```