

2D Arrays-2

Lecture- 15

Raghav Garg

COLLEGE
WALLAH

Ques : Write a program to print the multiplication of two matrices given by the user.

$$\begin{array}{c}
 \begin{array}{cc}
 & \begin{array}{c} 0 \\ 1 \end{array} \\
 \begin{array}{c} 0 \\ 1 \end{array} & \begin{array}{|c|c|} \hline 1 & 2 \\ \hline 3 & 4 \\ \hline \end{array} \\
 a & 2 \times 2
 \end{array}
 \times
 \begin{array}{c}
 \begin{array}{cc}
 & \begin{array}{c} 0 \\ 1 \end{array} \\
 \begin{array}{c} 0 \\ 1 \end{array} & \begin{array}{|c|c|} \hline 5 & 6 \\ \hline 7 & 8 \\ \hline \end{array} \\
 b & 2 \times 2
 \end{array}
 =
 \begin{array}{c}
 \begin{array}{cc}
 & \begin{array}{c} 0 \\ 1 \end{array} \\
 \begin{array}{c} 0 \\ 1 \end{array} & \begin{array}{|c|c|} \hline 19 & 14 \\ \hline 43 & 50 \\ \hline \end{array} \\
 res & 2 \times 2
 \end{array}
 \end{array}$$

row
2D array

column
2D array

COLLEGE
WALLAH

Ques : Write a program to print the multiplication of two matrices given by the user.

	0	1	2
0	1	2	3
1	4	5	6

2×3

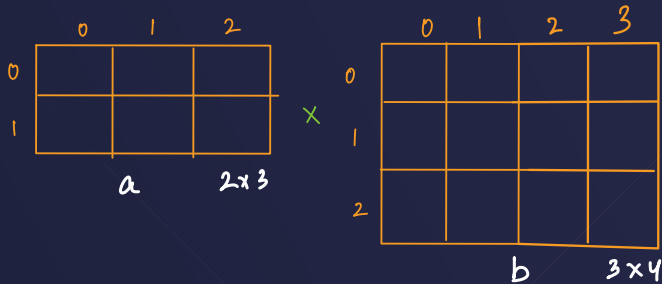
\times

	0	1	2	3
0	1	2	3	4
1	5	6	7	8
2	9	10	11	12

3×4

$=$

	0	1	2	3
0	38	44	50	56
1	83	98	113	128



$$res[0][0] = a[0][0] * b[0][0] + a[0][1] * b[1][0] + a[0][2] * b[2][0]$$

$$res[1][2] = a[1][0] * b[0][2] + a[1][1] * b[1][2] + a[1][2] * b[2][2]$$

$$res[i][j] = a[i][0] * b[0][j] + a[i][1] * b[1][j] + a[i][2] * b[2][j]$$

$$= \sum_{r=0}^{r=n-1} a[i][r] * b[r][j]$$

	0	1	2
0	1	2	3
1	4	5	6

a 2x3

x

	0	1	2	3
0	1	2	3	4
1	5	6	7	8
2	9	10	11	12

b 3x4

	0	1	2	3
0				
1			113	

res 2x4

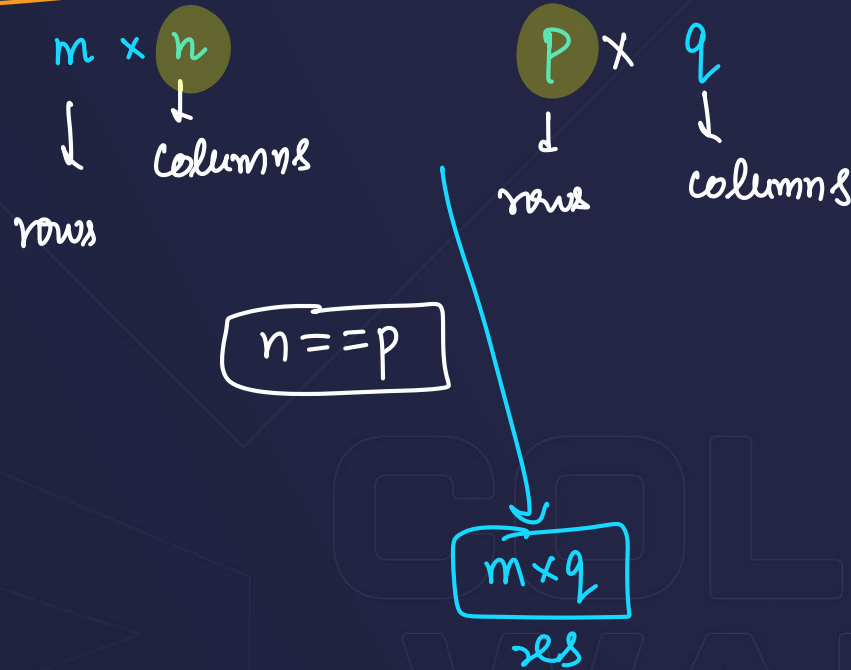
```
int res[m][q]; m=2, q=4
for(int i=0;i<m;i++){
    for(int j=0;j<q;j++){
        res[i][j] = 0;
        for(int k=0;k<p;k++){
            res[i][j] += a[i][k]*b[k][j];
        }
    }
}
cout<<endl;
```

$$res[1][2] = 0 \neq 47 \neq 113$$

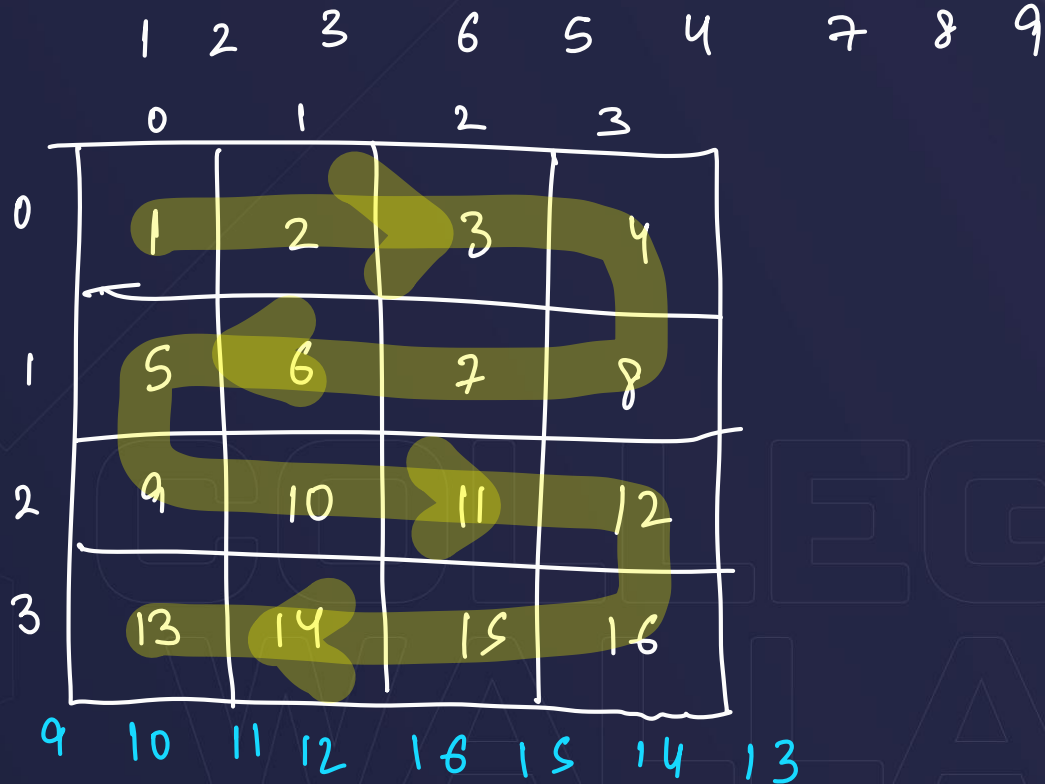
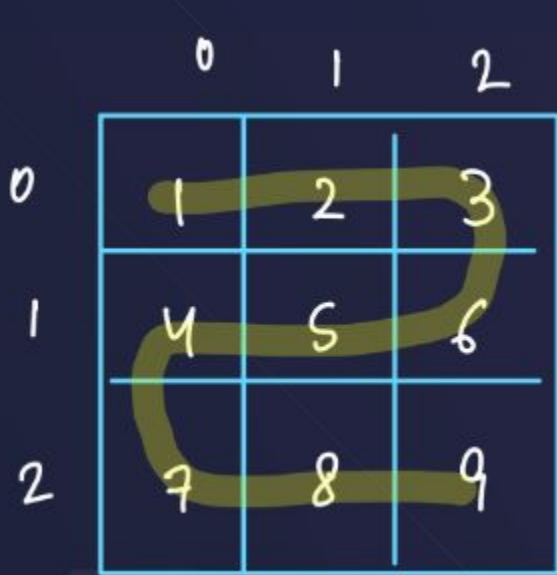
$$k = 0 \neq 2$$

$$res[1][2] += a[1][k] * b[k][2]$$

Ques : Write a program to print the multiplication of two matrices given by the user.



Ques : Write a program to print the matrix in wave form.



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

C.W.

Q, 1

	0	1	2
0	1	2	3
1	4	5	6
2	7	8	9

Q, 2

1	2	3
4	5	6
7	8	9

Column wise printing

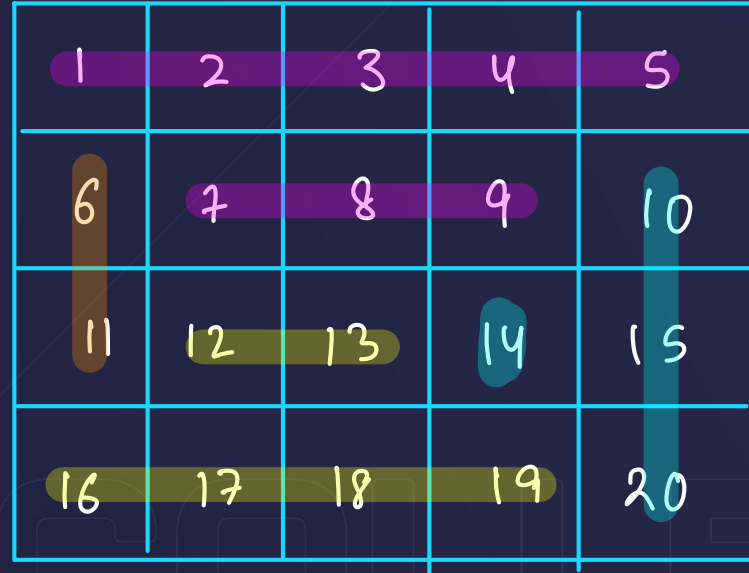
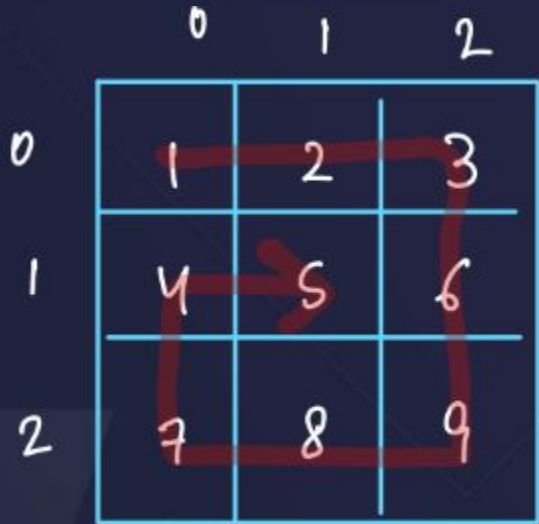
Output :

7 8 9 6 5 4 1 2 3

1 4 7 8 5 2 3 6 9

1 4 7 2 5 8 3 6 9

Ques : Write a program to print the matrix in spiral form.
[Leetcode 54]



Hint :
 Right
 Down
 Left
 Up

Output :

1 2 3 4 5 10 15 20 19 18 17 16
 11 6 7 8 9 14 13 12

	0	1	2	3	4
0	1	2	3	4	5
1	6	7	8	9	10
2	11	12	13	14	15
3	16	17	18	19	20

Hint:
Right
Down
Left
Up

1 loop ke andar
4 loops lagenge

minr
maxr
minc
maxr

Right → minr fix
minc to maxc
minr ++;

Down → maxc fix
minr to maxr
maxc --

	0	1	2	3	4
0	1	2	3	4	5
maxr 1	6	7	8	9	10
minr 2	11	12	13	14	15
3	16	17	18	19	20
	maxc		minc		

// left

```
for (int j = maxc; j >= minc; j--) {
    cout << arr[maxr][j] << " ";
}
maxr--;
```

// Right

```
for (int j = minc; j <= maxc; j++) {
    cout << arr[minr][j] << " ";
}
minr++;
```

// Down

```
for (int i = minr; i <= maxr; i++) {
    cout << arr[i][maxc] << " ";
}
maxc--;
```

// top

```
for (int i = maxr; i >= minr; i--) {
    cout << arr[i][minc] << " ";
}
minc++;
```

```
while(minr<=maxr && minc<=maxc){
    // right
    for(int j=minc;j<=maxc;j++){
        cout<<arr[minr][j]<<" ";
    }
    minr++;
    // down
    for(int i=minr;i<=maxr;i++){
        cout<<arr[i][maxc]<<" ";
    }
    maxc--;
    // left
    for(int j=maxc;j>=minc;j--){
        cout<<arr[maxr][j]<<" ";
    }
    maxr--;
    // up
    for(int i=maxr;i>=minr;i--){
        cout<<arr[i][minc]<<" ";
    }
    minc++;
} // 1 2 3 4 8 12 11 10 9 5 6 7
```

	0	1	2	3	
0	1	2	3	4	maxr
1	5	6	7	8	
2	9	10	11	12	minr
	maxc		minc		

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

COLLEGE
WALLAH

Thank you !!

COLLEGE
WALLAH