

Inverse of an Array:-

$N=5$

0	1	2	3	4
3	2	4	0	1
3	4	1	0	2

$i = 0 \times 2 \times 4 \times 5$
ans[i] = $2 \times 4 \times 0 \times 3$

$\text{ans}[\text{arr}[i]] = i$

$N=6$

0	1	2	3	4	5
3	0	4	1	5	2

$\text{int[]} \text{ans} = \text{new int}[\text{arr.length}];$
for ($i=0$ to $\text{arr.length}-1$) {
 $\text{ans}[\text{arr}[i]] = i;$
}

0 1 2 3 4 5
[1, 3, 5, 0, 2, 4]

$i = 0 \times 2 \times 4 \times 5$
 $\text{ans}[i] = 1 \times 3 \times 0 \times 4$

$\text{ans} [3, 0, 4, 1, 5, 2]$

```
public static int[] inverseArray(int[] arr) {
    int[] nans = new int[arr.length];
    for (int i = 0; i < arr.length; i++) {
        nans[arr[i]] = i;
    }
    return nans;
}
```

2D-Array

	0	1	2	3
0				
1				
2				
3				
4				

columns
arr.length = 5
 $\text{arr}[0].\text{length} = 4$ (5x4)

row = 3
col = 4
 $\text{ans2d} = [3][4]$

	0	1	2	3
0	3	4	5	7
1	10	25	3	55
2	22	24	27	28

```
for (int i = 0; i < arr2d.length; i++) {
    for (int j = 0; j < arr2d[0].length; j++) {
        arr2d[i][j] = s.nextInt();
    }
}
```

00, 01, 02, 03

$\text{ans2d}[1][2]$

2d array

Matrix Multiplication:-

0	1	2
0	1	2
1	4	5
2	7	8

A 3×3

0	1	2
0	1	2
1	4	5
2	7	8

B 3×3

=

$$\Rightarrow (A_{(0,0)} \times B_{(0,0)}) + (A_{(0,1)} \times B_{(1,0)}) + (A_{(0,2)} \times B_{(2,0)}) =$$

... .. in Row of 2nd array has to be

$$\Rightarrow (A (90 \times 100)) \cdot (100 \times 10) = 10000$$

\Rightarrow Columns of 1st array & Row of 2nd array has to be equal for valid multiplication.

\Rightarrow Row of 1st array & Col of 2nd array will be the Row and Col of Result array.

$$\begin{bmatrix} 0 & 1 & 2 \\ 1 & 3 & 1 \\ 2 & 2 & 2 \end{bmatrix}_{3 \times 3} \times \begin{bmatrix} 0 & 1 \\ 1 & 3 \\ 2 & 2 \end{bmatrix}_{3 \times 2} = \begin{bmatrix} 0 & 12 & 13 \\ 1 & 9 & 10 \\ 2 & 11 & 10 \end{bmatrix}_{3 \times 2}$$

$$n = 5$$

$$n = n + 5$$

$$n + 5$$

$$(1 \times 1) + (2 \times 4) + (3 \times 1) = 12$$

$$(1 \times 1) + (2 \times 3) + (3 \times 2) = 13$$

$$(2 \times 1) + (2 \times 4) + (1 \times 1) = 11$$

$$N = \begin{bmatrix} 0 & 1 \\ 1 & 2 \\ 2 & 2 \end{bmatrix}_{2 \times 2} \times \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}_{2 \times 2} = \begin{bmatrix} 0 & 1 \\ 1 & 2 \\ 2 & 2 \end{bmatrix}_{2 \times 2}$$

for (i=0 to N-1) {

for (j=0 to N-1) {

int sum = 0

for (k=0 to N-1) {

int curSum = A[i][k] * B[k][j];

Sum = Sum + curSum

}

$$(00 \times 00) + (01 \times 10)$$

$$A[i][k]$$

$$B[k][j]$$

$$\begin{array}{ccc} 2 & 2 & 2 \\ \hline 1 & 1 & 1 \\ 2 & 2 & 2 \end{array}$$

$$\begin{array}{ccc} 3 & 3 & \\ \downarrow & & \\ 2 & 2 & \end{array}$$

$i = 0$

$j = 0$

$k = 0$

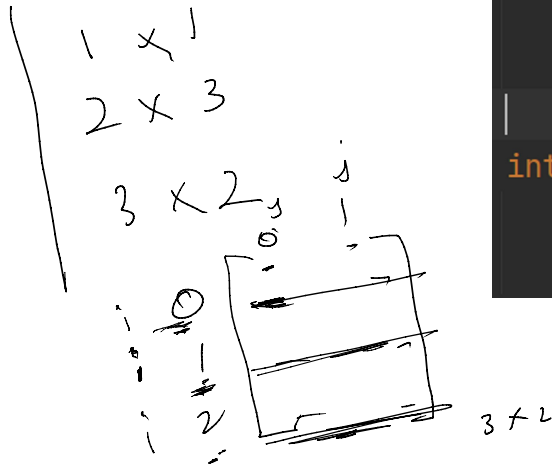
Sum = 0

```
0 for (int i = 0; i < ans.length; i++) {  
1     for (int j = 0; j < ans[0].length; j++) {  
2         int sum = 0;  
3         for (int k = 0; k < a[0].length; k++) {  
4             sum += a[i][k] * b[k][j];  
5         }  
6         ans[i][j] = sum;  
7     }  
8 }
```

$\frac{1}{2} \times \frac{1}{2} = 1$

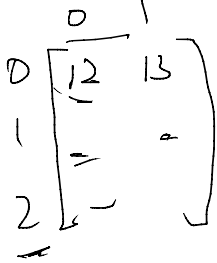
$\frac{2}{3} \times \frac{4}{5}$

$\frac{3}{4} \times 1$



```
0 int[][] a = {{1, 2, 3},  
1             {3, 1, 2},  
2             {2, 2, 1}};  
3  
4 int[][] b = {{1, 1},  
5             {4, 3},  
6             {1, 2}};
```

3 x 2



$$\begin{bmatrix} - & - & - \\ - & - & - \\ - & - & - \end{bmatrix}_{3 \times 3} \times \begin{bmatrix} - & - \\ - & - \\ - & - \end{bmatrix}_{3 \times 2} = \begin{bmatrix} - & - \\ - & - \\ - & - \end{bmatrix}$$