



SNS COLLEGE OF TECHNOLOGY

**Coimbatore – 35
An Autonomous Institution**

**Accredited by NBA – AICTE and Accredited by NAAC – UGC with ‘A+’ Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai**

DEPARTMENT OF AIML

PROGRAMMING FOR PROBLEM SOLVING

I YEAR - I SEM

UNIT III – ARRAYS AND STRINGS

TOPIC – MATRIX OPERATIONS

Matrix Addition

$$\text{mat1} = \{\{1, 2\}, \{3, 4\}\}$$

$$\text{mat2} = \{\{1, 2\}, \{3, 4\}\}$$

$$\text{mat1} + \text{mat2} = \{\{2, 4\}, \{6, 8\}\}$$

Matrix Subtraction

$$\text{mat1} = \{\{1, 2\}, \{3, 4\}\}$$

$$\text{mat2} = \{\{1, 2\}, \{3, 4\}\}$$

$$\text{mat1} - \text{mat2} = \{\{0, 0\}, \{0, 0\}\}$$

Matrix Multiplication

$$\text{mat1} = \{\{1, 2\}, \{3, 4\}\}$$

$$\text{mat2} = \{\{1, 2\}, \{3, 4\}\}$$

$$\text{mat1} * \text{mat2} = \{\{7, 10\}, \{15, 22\}\}$$



MATRIX ADDITION:

ALGORITHM

1. Input the order of the matrix.
2. Input the matrix 1 elements.
3. Input the matrix 2 elements.
4. Repeat from $i = 0$ to m
5. Repeat from $j = 0$ to n
6. $mat3[i][j] = mat1[i][j] + mat2[i][j]$
7. Print $mat3$.

PROGRAM CODE:

```
#include <stdio.h>

int main()
{
//fill your code

int m, n;

scanf("%d %d",&m,&n);

int i, j;

int mat1[m][n], mat2[m][n], mat3[m][n];

for(i = 0; i < m; i++)
{
for(j = 0; j < n; j++)
scanf("%d",&mat1[i][j]);
}

for(i = 0; i < n; i++)
{
for(j = 0; j < n; j++)
scanf("%d",&mat2[i][j]);
}
}
```



```
for(i = 0; i < m; i++)  
{  
for(j = 0; j < n; j++)  
{  
mat3[i][j] = mat1[i][j] + mat2[i][j];  
}  
}
```

```
for(i = 0; i < m; i++)  
{  
for(j = 0; j < n; j++)  
printf(“%d “, mat3[i][j]);  
printf(“\n”);  
}
```

```
return 0;  
}
```

OUTPUT:

```
> OUTPUT  
  
2 2 (order of the matrix)  
  
1 2 3 4 (matrix 1 elements)  
  
2 3 4 5 (matrix 2 elements)  
  
3 5 (resultant matrix)  
  
7 9
```



MATRIX SUBTRACTION:

ALGORITHM

1. Input the order of the matrix.
2. Input the matrix 1 elements.
3. Input the matrix 2 elements.
4. Repeat from $i = 0$ to m
5. Repeat from $j = 0$ to n
6. $mat3[i][j] = mat1[i][j] - mat2[i][j]$
7. Print $mat3$.

PROGRAM CODE:

```
#include <stdio.h>

int main()
{
int m, n;
scanf("%d %d",&m,&n);
int i, j;
int mat1[m][n], mat2[m][n], mat3[m][n];
for(i = 0; i < m; i++)
{
for(j = 0; j < n; j++)
scanf("%d",&mat1[i][j]);
}
for(i = 0; i < m; i++)
{
for(j = 0; j < n; j++)
scanf("%d",&mat2[i][j]);
}
```



```
for(i = 0; i < m; i++)  
{  
for(j = 0; j < n; j++)  
{  
mat3[i][j] = mat1[i][j] - mat2[i][j];  
}  
}
```

```
for(i = 0; i < m; i++)  
{  
for(j = 0; j < n; j++)  
printf(“%d “, mat3[i][j]);  
printf(“\n”);  
}
```

```
return 0;  
}
```

OUTPUT

```
λ OUTPUT  
  
2 2 (order of the matrix)  
5 6 7 8 (matrix 1 elements)  
1 2 3 4 (matrix 2 elements)  
  
4 4 (resultant matrix)  
  
4 4
```



MATRIX MULTIPLICATION:

ALGORITHM

1. Input the order of the matrix1 ($m * n$).
2. Input the order of matrix2 ($p * q$).
3. Input the matrix 1 elements.
4. Input the matrix 2 elements.
5. Repeat from $i = 0$ to m
6. Repeat from $j = 0$ to q
7. repeat from $k = 0$ to p
8. $sum = sum + mat1[c][k] * mat2[k][d];$
9. $mat3[c][d] = sum$
10. Print mat3.

PROGRAM CODE:

```
#include <stdio.h>

int main()
{
int m, n, p, q, c, d, k, sum = 0;
int mat1[10][10], mat2[10][10], mat3[10][10];

printf("Enter number of rows and columns of mat1 matrix\n");
scanf("%d%d", &m, &n);
printf("Enter elements of matrix 1\n");

for (c = 0; c < m; c++)
for (d = 0; d < n; d++)
scanf("%d", &mat1[c][d]);
```



```
printf("\nEnter number of rows and columns of mat2 matrix\n");
```

```
scanf("%d%d", &p, &q);
```

```
if (n != p)
```

```
printf("\nThe matrices can't be multiplied with each other.\n");
```

```
else
```

```
{
```

```
printf("\nEnter elements of matrix2\n");
```

```
for (c = 0; c < p; c++)
```

```
for (d = 0; d < q; d++)
```

```
scanf("%d", &mat2[c][d]);
```

```
for (c = 0; c < m; c++) {
```

```
for (d = 0; d < q; d++) {
```

```
for (k = 0; k < p; k++) {
```

```
sum = sum + mat1[c][k]*mat2[k][d];
```

```
}
```

```
mat3[c][d] = sum;
```

```
sum = 0;
```

```
}
```

```
}
```

```
printf("\nProduct of the matrices:\n");
```

```
for (c = 0; c < m; c++) {
```



```
for (d = 0; d < q; d++)  
    printf("%d\t", mat3[c][d]);  
  
    printf("\n");  
}  
}  
  
return 0;  
}
```

OUTPUT

OUTPUT

Enter number of rows and columns of mat1 matrix

2 2

Enter elements of matrix 1

2 3 4 5

Enter number of rows and columns of mat2 matrix

2 2

Enter elements of matrix 2

1 2 3 4

Product of the matrices:

11 16

19 28