# ----------2-D ARRAY PROGRAM------

**//WAP to input and output m*n matrix**

```
#include<stdio.h>
#include<conio.h>
int main(){
	int a[100][100],m, n, i, j;
	printf("Enter the size of row of matrx:");
	scanf("%d",&m);
	printf("Enter the size of column of matrx:");
	scanf("%d",&n);

	//input matrix
	for(i=0;i<m;i++){
		for(j=0; j<n; j++){
			printf("Enter a[%d][%d] element:", i, j);
			scanf("%d",&a[i][j]);
		}
	}

	//output matrix
	printf("\nThe %d*%d matrix is:\n",m, n);
	for(i=0; i<m; i++){
		for(j=0; j<n; j++){
			printf("%d\t",a[i][j]);
		}
		printf("\n");
	}
getch();
return 0;
 }
```

**//WAP to find sum of all elements in m*n matrix**

```
#include<stdio.h>
#include<conio.h>
int main(){
	int a[100][100],m, n, i, j, sum=0;
	printf("Enter the size of row of matrx:");
	scanf("%d",&m);
	printf("Enter the size of column of matrx:");
	scanf("%d",&n);
```

```
        //input matrix
        for(i=0;i<m;i++){
                for(j=0; j<n; j++){
                        printf("Enter a[%d][%d] element:", i, j);
                        scanf("%d",&a[i][j]);
                }
        }

        //output matrix
        printf("\nThe %d*%d matrix is:\n",m, n);
        for(i=0; i<m; i++){
                for(j=0; j<n; j++){
                        printf("%d\t",a[i][j]);
                }
                printf("\n");
        }

        //find sum of all elements
        for(i=0; i<m; i++){
                for(j=0; j<n; j++){
                        sum=sum+a[i][j];
                }
        }
        printf("\nThe sum of elements is:%d", sum);

getch();
return 0;
 }
```

**//WAP to find transpose m*n matrix.**

```
#include<stdio.h>
#include<conio.h>
int main(){
        int a[100][100], b[100][100] ,m, n, i, j;
        printf("Enter the size of row of matrx:");
        scanf("%d",&m);
        printf("Enter the size of column of matrx:");
        scanf("%d",&n);
```

```
        //input matrix
        for(i=0;i<m;i++){
                for(j=0; j<n; j++){
                        printf("Enter a[%d][%d] element:", i, j);
                        scanf("%d",&a[i][j]);
                }
        }

        //output matrix
        printf("\nThe %d*%d matrix is:\n",m, n);
        for(i=0; i<m; i++){
                for(j=0; j<n; j++){
                        printf("%d\t",a[i][j]);
                }
                printf("\n");
        }

        //Calculating transpose
        for(i=0; i<m; i++){
                for(j=0; j<n; j++){
                        b[j][i]=a[i][j];
                }
        }

        //outputing transpose
        printf("\nThe Transpose of %d*%d matrix is:\n",m, n);
        for(i=0; i<n; i++){
                for(j=0; j<m; j++){
                        printf("%d\t",b[i][j]);
                }
                printf("\n");
        }
getch();
return 0;
 }
```

**//WAP to find sum of only even elements in m*n matrix**

```
#include<stdio.h>
#include<conio.h>
int main(){
        int a[100][100],m, n, i, j, sum=0;
        printf("Enter the size of row of matrx:");
        scanf("%d",&m);
```

```
        printf("Enter the size of column of matrx:");
        scanf("%d",&n);

        //input matrix
        for(i=0;i<m;i++){
                for(j=0; j<n; j++){
                        printf("Enter a[%d][%d] element:", i, j);
                        scanf("%d",&a[i][j]);
                }
        }

        //output matrix
        printf("\nThe %d*%d matrix is:\n",m, n);
        for(i=0; i<m; i++){
                for(j=0; j<n; j++){
                        printf("%d\t",a[i][j]);
                }
                printf("\n");
        }

        //find sum of only even elements
        for(i=0; i<m; i++){
                for(j=0; j<n; j++){
                        if(a[i][j]%2==0){
                                sum=sum+a[i][j];
                        }
                }
        }
        printf("\nThe sum even elements is:%d", sum);

getch();
return 0;
 }
```

**//WAP to find sum of only odd elements in m*n matrix**

```
#include<stdio.h>
#include<conio.h>
int main(){
        int a[100][100],m, n, i, j, sum=0;
        printf("Enter the size of row of matrx:");
        scanf("%d",&m);
        printf("Enter the size of column of matrx:");
        scanf("%d",&n);
```

```
        //input matrix
        for(i=0;i<m;i++){
                for(j=0; j<n; j++){
                        printf("Enter a[%d][%d] element:", i, j);
                        scanf("%d",&a[i][j]);
                }
        }

        //output matrix
        printf("\nThe %d*%d matrix is:\n",m, n);
        for(i=0; i<m; i++){
                for(j=0; j<n; j++){
                        printf("%d\t",a[i][j]);
                }
                printf("\n");
        }

        //find sum of only odd elements
        for(i=0; i<m; i++){
                for(j=0; j<n; j++){
                        if(a[i][j]%2!=0){
                                sum=sum+a[i][j];
                        }
                }
        }
        printf("\nThe sum odd elements is:%d", sum);

getch();
return 0;
 }
```

**//WAP to find sum of main diagonal (also called trace of matrix) of n*n square matrix**

```
#include<stdio.h>
#include<conio.h>
int main(){
        int a[100][100],m, n, i, j, sum=0;
        printf("Enter the size of square of matrx:");
        scanf("%d",&n);
```

```
        //input matrix
        for(i=0;i<n;i++){
                for(j=0; j<n; j++){
                        printf("Enter a[%d][%d] element:", i, j);
                        scanf("%d",&a[i][j]);
                }
        }

        //output matrix
        printf("\nThe %d*%d matrix is:\n",n, n);
        for(i=0; i<n; i++){
                for(j=0; j<n; j++){
                        printf("%d\t",a[i][j]);
                }
                printf("\n");
        }

        //find sum of main diagonal elements
        for(i=0; i<n; i++){
                for(j=0; j<n; j++){
                        if(i==j){
                                sum=sum+a[i][j];
                        }
                }
        }
        printf("\nThe sum main diagonal elements is:%d", sum);

getch();
return 0;
 }
```

**//WAP to find sum of right diagonal of n*n square matrix**

```
#include<stdio.h>
#include<conio.h>
int main(){
        int a[100][100],m, n, i, j, sum=0;
        printf("Enter the size of square of matrx:");
        scanf("%d",&n);
```

```
        //input matrix
        for(i=0;i<n;i++){
                for(j=0; j<n; j++){
                        printf("Enter a[%d][%d] element:", i, j);
                        scanf("%d",&a[i][j]);
                }
        }

        //output matrix
        printf("\nThe %d*%d matrix is:\n",n, n);
        for(i=0; i<n; i++){
                for(j=0; j<n; j++){
                        printf("%d\t",a[i][j]);
                }
                printf("\n");
        }

        //find sum of right diagonal elements
        for(i=0; i<n; i++){
                for(j=0; j<n; j++){
                        if((i+j)==(n-1)){
                                sum=sum+a[i][j];
                        }
                }
        }
        printf("\nThe sum of right diagonal elements is:%d", sum);

getch();
return 0;
 }
```

**//WAP to find highest element of m*n matrix.**

```
#include<stdio.h>
#include<conio.h>
int main(){
        int a[100][100],m, n, i, j, max;
        printf("Enter the size of row of matrx:");
        scanf("%d",&m);
        printf("Enter the size of column of matrx:");
        scanf("%d",&n);
```

```
        //input matrix
        for(i=0;i<m;i++){
                for(j=0; j<n; j++){
                        printf("Enter a[%d][%d] element:", i, j);
                        scanf("%d",&a[i][j]);
                }
        }

        //output matrix
        printf("\nThe %d*%d matrix is:\n",m, n);
        for(i=0; i<m; i++){
                for(j=0; j<n; j++){
                        printf("%d\t",a[i][j]);
                }
                printf("\n");
        }

        //finding highest element
        max=a[0][0];
        for(i=0; i<m; i++){
                for(j=0; j<n; j++){
                        if(a[i][j]>max){
                                max=a[i][j];
                        }
                }
        }
        printf("\nThe Highest elements is:%d", max);

getch();
return 0;
 }
```

**//WAP to find Lowest element of m*n matrix.**

```
#include<stdio.h>
#include<conio.h>
int main(){
        int a[100][100],m, n, i, j, low;
        printf("Enter the size of row of matrx:");
        scanf("%d",&m);
        printf("Enter the size of column of matrx:");
        scanf("%d",&n);
```

```
        //input matrix
        for(i=0;i<m;i++){
                for(j=0; j<n; j++){
                        printf("Enter a[%d][%d] element:", i, j);
                        scanf("%d",&a[i][j]);
                }
        }

        //output matrix
        printf("\nThe %d*%d matrix is:\n",m, n);
        for(i=0; i<m; i++){
                for(j=0; j<n; j++){
                        printf("%d\t",a[i][j]);
                }
                printf("\n");
        }

        //finding highest element
        low=a[0][0];
        for(i=0; i<m; i++){
                for(j=0; j<n; j++){
                        if(a[i][j]<low){
                                low=a[i][j];
                        }
                }
        }
        printf("\nThe Highest elements is:%d", low);

getch();
return 0;
 }
```

**//WAP to find norm of of m*n square matrix. (***The norm is defined as the square root of the sum of squares of all elements in the matrix***)**

```
#include<stdio.h>
#include<conio.h>
#include<math.h>
int main(){
        int a[100][100],m, n, i, j, sum;
        double norm;
        printf("Enter the size of row of matrx:");
        scanf("%d",&m);
```

```
        printf("Enter the size of column of matrx:");
        scanf("%d",&n);

        //input matrix
        for(i=0;i<m;i++){
                for(j=0; j<n; j++){
                        printf("Enter a[%d][%d] element:", i, j);
                        scanf("%d",&a[i][j]);
                }
        }

        //output matrix
        printf("\nThe %d*%d matrix is:\n",m, n);
        for(i=0; i<m; i++){
                for(j=0; j<n; j++){
                        printf("%d\t",a[i][j]);
                }
                printf("\n");
        }

        //finding norm of matrix element
        for(i=0; i<m; i++){
                for(j=0; j<n; j++){
                        sum = sum+(a[i][j]*a[i][j]);
                }
        }
        norm = sqrt(sum);
        printf("\nThe norm of matrix is:%f", norm);

getch();
return 0;
 }
```

**//WAP to find sum of individual rows of m*n matrix.**

```
#include<stdio.h>
#include<conio.h>
int main(){
        int a[100][100],m, n, i, j, sum;
        printf("Enter the size of row of matrx:");
        scanf("%d",&m);
        printf("Enter the size of column of matrx:");
        scanf("%d",&n);
```

```
        //input matrix
        for(i=0;i<m;i++){
                for(j=0; j<n; j++){
                        printf("Enter a[%d][%d] element:", i, j);
                        scanf("%d",&a[i][j]);
                }
        }

        //output matrix
        printf("\nThe %d*%d matrix is:\n",m, n);
        for(i=0; i<m; i++){
                for(j=0; j<n; j++){
                        printf("%d\t",a[i][j]);
                }
                printf("\n");
        }

        //finding sum of individual rows
        for(i=0; i<m; i++){
                sum=0;
                        for(j=0; j<n; j++){
                                sum = sum+a[i][j];
                        }
                        printf("\nSum of %d Row :%d",i , sum);
        }
getch();
return 0;
 }
```

**//WAP to find sum of individual columns of m*n matrix.**

```
#include<stdio.h>
#include<conio.h>
int main(){
        int a[100][100],m, n, i, j, sum;
        printf("Enter the size of row of matrx:");
        scanf("%d",&m);
        printf("Enter the size of column of matrx:");
        scanf("%d",&n);
```

```
        //input matrix
        for(i=0;i<m;i++){
                for(j=0; j<n; j++){
                        printf("Enter a[%d][%d] element:", i, j);
                        scanf("%d",&a[i][j]);
                }
        }

        //output matrix
        printf("\nThe %d*%d matrix is:\n",m, n);
        for(i=0; i<m; i++){
                for(j=0; j<n; j++){
                        printf("%d\t",a[i][j]);
                }
                printf("\n");
        }

        //finding sum of individual columns
        for(i=0; i<m; i++){
                sum=0;
                        for(j=0; j<n; j++){
                                sum = sum+a[j][i];
                        }
                        printf("\nSum of %d Column :%d",j , sum);
        }
getch();
return 0;
 }
```

**//WAP to add two n*n square matrix (***Two matrices may be added or subtracted only if they have the same dimension; that is, they must have the same number of rows and columns.***)**

```
#include<stdio.h>
#include<conio.h>
int main(){
        int a[100][100], b[100][100] , c[100][100], n, i, j;
        printf("Enter the size of square matrx:");
        scanf("%d",&n);
```

```
//input First matrix
printf("\nEnter First array elements:\n");
for(i=0;i<n;i++){
        for(j=0; j<n; j++){
                printf("Enter a[%d][%d] element:", i, j);
                scanf("%d",&a[i][j]);
        }
}

//input Second array
printf("\nEnter Second array elements:\n");
for(i=0;i<n;i++){
        for(j=0; j<n; j++){
                printf("Enter b[%d][%d] element:", i, j);
                scanf("%d",&b[i][j]);
        }
}

//output First matrx
printf("\nThe first %d*%d matrix is:\n",n, n);
for(i=0; i<n; i++){
        for(j=0; j<n; j++){
                printf("%d\t",a[i][j]);
        }
        printf("\n");
}

//output Second matrix
printf("\nThe Second %d*%d matrix is:\n",n, n);
for(i=0; i<n; i++){
        for(j=0; j<n; j++){
                printf("%d\t",b[i][j]);
        }
        printf("\n");
}

//Adding two matrix
for(i=0; i<n; i++){
        for(j=0; j<n; j++){
                c[i][j]=a[i][j]+b[i][j];
        }
}
```

```
        //output Added array
        printf("\nThe Added %d*%d matrix is:\n",n, n);
        for(i=0; i<n; i++){
                for(j=0; j<n; j++){
                        printf("%d\t",c[i][j]);
                }
                printf("\n");
        }
getch();
return 0;
 }
```

**//WAP to Subtract two n*n square matrix (***Two matrices may be added or subtracted only if they have the same dimension; that is, they must have the same number of rows and columns.***)**

```
#include<stdio.h>
#include<conio.h>
int main(){
        int a[100][100], b[100][100] , c[100][100], n, i, j;
        printf("Enter the size of square matrx:");
        scanf("%d",&n);


        //input First matrix
        printf("\nEnter First array elements:\n");
        for(i=0;i<n;i++){
                for(j=0; j<n; j++){
                        printf("Enter a[%d][%d] element:", i, j);
                        scanf("%d",&a[i][j]);
                }
        }

        //input Second array
        printf("\nEnter Second array elements:\n");
        for(i=0;i<n;i++){
                for(j=0; j<n; j++){
                        printf("Enter b[%d][%d] element:", i, j);
                        scanf("%d",&b[i][j]);
                }
        }
```

```
        //output First matrx
        printf("\nThe first %d*%d matrix is:\n",n, n);
        for(i=0; i<n; i++){
                for(j=0; j<n; j++){
                        printf("%d\t",a[i][j]);
                }
                printf("\n");
        }

        //output Second matrix
        printf("\nThe Second %d*%d matrix is:\n",n, n);
        for(i=0; i<n; i++){
                for(j=0; j<n; j++){
                        printf("%d\t",b[i][j]);
                }
                printf("\n");
        }

        //subtracting two matrix
        for(i=0; i<n; i++){
                for(j=0; j<n; j++){
                        c[i][j]=a[i][j]-b[i][j];
                }
        }

        //output subtracted array
        printf("\nThe subtracted %d*%d matrix is:\n",n, n);
        for(i=0; i<n; i++){
                for(j=0; j<n; j++){
                        printf("%d\t",c[i][j]);
                }
                printf("\n");
        }
getch();
return 0;
 }
```

**//WAP to find upper triangular matrix of n*n square matrix. (***The upper triangular matrix is a special type of square matrix that has all the elements below the main diagonal as zero.***)**

```
#include<stdio.h>
#include<conio.h>
int main(){
	int a[100][100],m, n, i, j, sum;
	printf("Enter the size square matrix:");
	scanf("%d",&n);

	//input matrix
	for(i=0;i<n;i++){
		for(j=0; j<n; j++){
			printf("Enter a[%d][%d] element:", i, j);
			scanf("%d",&a[i][j]);
		}
	}

	//output matrix
	printf("\nThe %d*%d matrix is:\n",n, n);
	for(i=0; i<n; i++){
		for(j=0; j<n; j++){
			printf("%d\t",a[i][j]);
		}
		printf("\n");
	}

	//calculating upper triangular
	for(i=0; i<n; i++){
		for(j=0; j<n; j++){
			if(i>j){
				a[i][j]=0;
			}
		}
	}

	//output upper triangular matrix
	printf("\nThe upper triangular matrix is:\n");
	for(i=0; i<n; i++){
		for(j=0; j<n; j++){
			printf("%d\t",a[i][j]);
		}
		printf("\n");
	}

getch();
```

```
return 0;
 }
```

**//WAP to find Lower triangular matrix of n*n square matrix. (***The Lower triangular matrix is a special type of square matrix that has all the elements above the main diagonal as zero.***)**

```
#include<stdio.h>
#include<conio.h>
int main(){
        int a[100][100],m, n, i, j, sum;
        printf("Enter the size square matrix:");
        scanf("%d",&n);

        //input matrix
        for(i=0;i<n;i++){
                for(j=0; j<n; j++){
                        printf("Enter a[%d][%d] element:", i, j);
                        scanf("%d",&a[i][j]);
                }
        }

        //output matrix
        printf("\nThe %d*%d matrix is:\n",n, n);
        for(i=0; i<n; i++){
                for(j=0; j<n; j++){
                        printf("%d\t",a[i][j]);
                }
                printf("\n");
        }

        //calculating lower triangular
        for(i=0; i<n; i++){
                for(j=0; j<n; j++){
                        if(j>i){
                                a[i][j]=0;
                        }
                }
        }
```

```
        //output lower triangular matrix
        printf("\nThe lower triangular matrix is:\n");
        for(i=0; i<n; i++){
                for(j=0; j<n; j++){
                        printf("%d\t",a[i][j]);
                }
                printf("\n");
        }

getch();
return 0;
 }
```

**//WAP to Multiply two m*n matrix.(** For **matrix multiplication**, the number of columns in the first matrix**(n1)** must be equal to the number of rows in the second matrix**(m2)** The result matrix has the number of rows of the first and the number of columns of the second matrix i.e resultant matrix is **m1*n2)**

```
#include<stdio.h>
#include<conio.h>
#include<stdlib.h>
int main(){
        int a[100][100], b[100][100], c[100][100], m1,m2, n1, n2, i, j,k, sum=0;
        printf("Enter the size of row of first matrx:");
        scanf("%d",&m1);
        printf("Enter the size of column of frist matrix:");
        scanf("%d",&n1);
        printf("Enter the size of row of Second matrix:");
        scanf("%d",&m2);
        printf("Enter the size of column of Second matrix:");
        scanf("%d",&n2);

        if(n1!=m2){
                printf("\nmatrix multiplication not possible");
                exit(0);
        }
        //input first matrix
        for(i=0;i<m1;i++){
                for(j=0; j<n1; j++){
                        printf("Enter a[%d][%d] element:", i, j);
                        scanf("%d",&a[i][j]);
                }
        }
```

```
//input Second matrix
for(i=0;i<m2;i++){
        for(j=0; j<n2; j++){
                printf("Enter b[%d][%d] element:", i, j);
                scanf("%d",&b[i][j]);
        }
}

//output First matrix
printf("\nThe %d*%d matrix is:\n",m1, n1);
for(i=0; i<m1; i++){
        for(j=0; j<n1; j++){
                printf("%d\t",a[i][j]);
        }
        printf("\n");
}

//output Second matrix
printf("\nThe %d*%d matrix is:\n",m2, n2);
for(i=0; i<m2; i++){
        for(j=0; j<n2; j++){
                printf("%d\t",b[i][j]);
        }
        printf("\n");
}
//Multiplying two matrix
for(i=0; i<m1; i++){
        for(j=0; j<n2; j++){
                for(k=0; k<n1; k++){
                                sum=sum+a[i][k]*b[k][j];
                }
                c[i][j]=sum;
                sum=0;
        }
}
        //output Multiplied matrix
printf("\nThe %d*%d matrix is:\n",m1, n2);
for(i=0; i<m1; i++){
        for(j=0; j<n2; j++){
                printf("%d\t",c[i][j]);
        }
        printf("\n");
```

```
        }
getch();
return 0;
 }
```