**2D Array**

**Basics of 2D array (Declaration and Initialization)**

#include<stdio.h>

int main()

{

int a[2][2]={{2,3},{4,5}};

int a1[2][2]={2,3,4,5};

int a2[2][2]={{2},{1,5}};

int a3[2][2]={1,2};

int a4[2][2]={0};

int a5[][2]={1,2,3};

int i,j;

printf("\n Elements of first array are:\n");

for(i=0;i<2;i++)

{

for(j=0;j<2;j++)

{

printf("%d ",a[i][j]);

}

printf("\n");

}

printf("\n Elements of second array are:\n");

for(i=0;i<2;i++)

{

for(j=0;j<2;j++)

{

printf("%d ",a1[i][j]);

}

printf("\n");

}

printf("\n Elements of third array are:\n");

for(i=0;i<2;i++)

{

for(j=0;j<2;j++)

{

printf("%d ",a2[i][j]);

}

printf("\n");

}

printf("\n Elements of fourth array are:\n");

for(i=0;i<2;i++)

{

for(j=0;j<2;j++)

{

printf("%d ",a3[i][j]);

}

printf("\n");

}

}

**Write a program to read and display elements of 2D array**

#include<stdio.h>

int main()

{

int a[3][3], i, j;

for(i=0; i<3; i++)

{ // for loop for rows

for(j=0; j<3;j++)

{ // for loop for columns

printf("enter the value of a[%d][%d]:", i, j);

scanf("%d", &a[i][j]);

} //end for columns

} //end for rows

printf("elements of 2D matrix are");

for(i=0; i<3; i++)

{

for(j=0;j<3;j++)

{

printf("%d\t", a[i][j]);

} //end for

printf("\n");

} //end for

return 0;

}

**Write a program to find the sum of all elements of 1D array**

#include<stdio.h>

int main()

{

int a[3][3], i, j,sum=0;

for(i=0; i<3; i++)

{ // for loop for rows

for(j=0; j<3;j++)

{ // for loop for columns

printf("enter the value of a[%d][%d]:", i, j);

scanf("%d", &a[i][j]);

} //end for columns

} //end for rows

printf("elements of 2D matrix are");

for(i=0; i<3; i++)

{

for(j=0;j<3;j++)

{

sum=sum+a[i][j];

} //end for

printf("\n");

} //end for

printf("\n Sum is:%d",sum);

return 0;

}

**Matrix Operations**

**WAP to find the sum of two matrices**

//Write a program to add 2 matrices (3X3)

#include <stdio.h>

int main()

{

float a[3][3], b[3][3], c[3][3];

int i, j;

printf("Enter elements of 1st matrix\n");

for(i=0; i<3; i++)

{

for(j=0; j<3 ;j++)

{

printf("Enter a%d%d: ", i, j);

scanf("%f", &a[i][j]);

}

}

// Taking input using nested for loop

printf("Enter elements of 2nd matrix\n");

for(i=0; i<3; i++)

{

for(j=0; j<3; j++)

{

printf("Enter b%d%d: ", i, j);

scanf("%f", &b[i][j]);

}

}

// adding corresponding elements of two arrays

for(i=0; i<3; i++)

{

for(j=0; j<3; j++)

{

c[i][j] = a[i][j] + b[i][j];

}

}

// Displaying the sum

printf("\nSum Of Matrix:\n");

for(i=0; i<3; i++)

{

for(j=0; j<3; j++)

{

printf("%.1f\t", c[i][j]);

}

printf("\n");

}

return 0;

}

**WAP to display the transpose of a matrix**

#include <stdio.h>

int main()

{

int a[10][10], transpose[10][10], r, c, i, j;

printf("Enter rows and columns of matrix: ");

scanf("%d %d", &r, &c);

// Storing elements of the matrix

printf("\nEnter elements of matrix:\n");

for(i=0; i<r; i++)

{

for(j=0; j<c; j++)

{

printf("Enter element a%d%d: ",i, j);

scanf("%d", &a[i][j]);

}

}

// Displaying the matrix a[][] \*/

printf("\nEntered Matrix: \n");

for(i=0; i<r; i++)

{

for(j=0; j<c; j++)

{

printf("%d ", a[i][j]);

}

printf("\n\n");

}

// Finding the transpose of matrix a

for(i=0; i<r; i++)

{

for(j=0; j<c; j++)

{

transpose[i][j] = a[j][i];

}

}

// Displaying the transpose of matrix a

printf("\nTranspose of Matrix:\n");

for(i=0; i<r; i++)

{

for(j=0; j<c; j++)

{

printf("%d ",transpose[i][j]);

}

printf("\n\n");

}

return 0;

}

**WAP to find the sum of diagonal elements of a matrix**

#include<stdio.h>

int main()

{

int a[10][10],sum=0;

int i,j,m,n;

printf("Enter number of rows and column:");

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

printf("Enter Elements : ");

for(i=0;i<m;i++)

{

for(j=0;j<n;j++)

{

scanf("%d",&a[i][j]);

}

}

for(i=0;i<m;i++)

{

for(j=0;j<n;j++)

{

if(i==j)

{

sum=sum+a[i][j];

}

}

}

printf("Sum of Diagonal Elements = %d ",sum);

}

**WAP to perform multiplication of 2 matrices and display the result**

#include <stdio.h>

int main()

{

int a[10][10], b[10][10], result[10][10], r1, c1, r2, c2, i, j, k;

printf("Enter rows and column for first matrix: ");

scanf("%d %d", &r1, &c1);

printf("Enter rows and column for second matrix: ");

scanf("%d %d",&r2, &c2);

// Column of first matrix should be equal to column of second matrix and

while (c1 != r2)

{

printf("Error! No. of columns of first matrix not equal to no.of row of second.\n\n");

printf("Enter rows and column for first matrix: ");

scanf("%d %d", &r1, &c1);

printf("Enter rows and column for second matrix: ");

scanf("%d %d",&r2, &c2);

}

// Storing elements of first matrix.

printf("\nEnter elements of matrix 1:\n");

for(i=0; i<r1; i++)

{

for(j=0; j<c1; j++)

{

printf("Enter elements a%d%d: ",i,j);

scanf("%d", &a[i][j]);

}

}

// Storing elements of second matrix.

printf("\nEnter elements of matrix 2:\n");

for(i=0; i<r2; i++)

{

for(j=0; j<c2; j++)

{

printf("Enter elements b%d%d: ",i, j);

scanf("%d",&b[i][j]);

}

}

// Initializing all elements of result matrix to 0

for(i=0; i<r1; i++)

{

for(j=0; j<c2; j++)

{

result[i][j] = 0;

}

}

// Multiplying matrices a and b and

// storing result in result matrix

for(i=0; i<r1; i++)

{

for(j=0; j<c2; j++)

{

for(k=0; k<c1; k++)

{

result[i][j]+=a[i][k]\*b[k][j];

}

}

}

// Displaying the result

printf("\nOutput Matrix:\n");

for(i=0; i<r1; i++)

{

for(j=0; j<c2; j++)

{

printf("%d ", result[i][j]);

}

printf("\n\n");

}

return 0;

}

**Practice questions to do:**

WAP to display the count of odd array elements in 2D array

WAP to find the sum of all prime array elements in 2D array

WAP to find the sum of those array elements which are multiple of 5 of 2D array

WAP to subtract, divide, modulo two matrices (-, /, %)

