**Assignment - 16 A Job Ready Bootcamp in C++, DSA and IOT MySirG**

**Multi-Dimensional Array in C Language**

1. Write a program to calculate the sum of two matrices each of order 3x3.

Sol – 1.

#include<stdio.h>

#include<conio.h>

int main()

{

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

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

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

{

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

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

}

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

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

{

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

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

}

printf("Sum of matrices is :\n");

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

{

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

printf("%2d ",a[i][j]+b[i][j]);

printf("\n");

}

getch();

return 0;

}

1. Write a program to calculate the product of two matrices each of order 3x3.

Sol – 2.

#include<stdio.h>

#include<conio.h>

int main()

{

int a[3][3],b[3][3],i,j,sum,sum1,sum2;

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

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

{

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

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

}

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

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

{

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

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

}

printf("Multiplication of matrices is :\n");

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

{

sum=0,sum1=0,sum2=0;

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

{

sum=sum+a[i][j]\*b[j][0];

sum1=sum1+a[i][j]\*b[j][1];

sum2=sum2+a[i][j]\*b[j][2];

}

printf("%3d %3d %3d",sum,sum1,sum2);

printf("\n");

}

getch();

return 0;

}

1. Write a program in C to find the transpose of a given matrix.

Sol – 3.

#include<stdio.h>

#include<conio.h>

int main()

{

int i,j,size;

printf("Enter order of square matrix : ");

scanf("%d",&size);

int a[size][size];

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

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

{

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

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

}

printf("Transpose of matrix is\n");

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

{

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

printf("%2d ",a[j][i]);

printf("\n");

}

getch();

return 0;

}

OR

#include<stdio.h>

#include<conio.h>

int main()

{

int i,j,temp,size;

printf("Enter order of square matrix : ");

scanf("%d",&size);

int a[size][size];

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

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

{

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

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

}

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

{

for(j=i+1;j<size;j++)

{

temp=a[i][j];

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

a[j][i]=temp;

}

}

printf("Transpose of matrix is :\n");

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

{

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

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

printf("\n");

}

getch();

return 0;

}

1. Write a program in C to find the sum of right diagonals of a matrix.

Sol – 4.

#include<stdio.h>

#include<conio.h>

int main()

{

int i,j,size,sum=0;

printf("Enter order of square matrix : ");

scanf("%d",&size);

int a[size][size];

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

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

{

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

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

}

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

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

printf("Sum of right diagonal of matrix is : %d\n",sum);

getch();

return 0;

}

1. Write a program in C to find the sum of left diagonals of a matrix.

Sol – 5.

#include<stdio.h>

#include<conio.h>

int main()

{

int i,j,size,sum=0;

printf("Enter order of square matrix : ");

scanf("%d",&size);

int a[size][size];

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

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

{

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

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

}

j=size-1;

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

{

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

j--;

}

printf("Sum of left diagonal of matrix is : %d\n",sum);

getch();

return 0;

}

1. Write a program in C to find the sum of rows and columns of a Matrix.

Sol – 6.

#include<stdio.h>

#include<conio.h>

int main()

{

int i,j,row,column,sum;

printf("Enter number of rows : ");

scanf("%d",&row);

printf("Enter number of columns : ");

scanf("%d",&column);

int a[row][column];

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

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

{

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

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

}

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

{

sum=0;

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

{

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

}

printf("Sum of %d row : %d\n",i+1,sum);

}

printf("\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\n");

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

{

sum=0;

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

{

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

}

printf("Sum of %d column : %d\n",i+1,sum);

}

getch();

return 0;

}

1. Write a program in C to print or display the lower triangular of a given matrix.

Sum – 7.

#include<stdio.h>

#include<conio.h>

int main()

{

int i,j,size;

printf("Enter order of square matrix : ");

scanf("%d",&size);

int a[size][size];

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

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

{

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

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

}

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

{

for(j=i+1;j<size;j++)

a[i][j]=0;

}

printf("\nLower triangular matrix\n\n");

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

{

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

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

printf("\n");

}

getch();

return 0;

}

1. Write a program in C to print or display an upper triangular matrix.

Sol – 8.

#include<stdio.h>

#include<conio.h>

int main()

{

int i,j,size;

printf("Enter order of square matrix : ");

scanf("%d",&size);

int a[size][size];

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

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

{

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

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

}

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

{

for(j=i+1;j<size;j++)

a[j][i]=0;

}

printf("\nUpper triangular matrix\n\n");

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

{

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

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

printf("\n");

}

getch();

return 0;

}

1. Write a program in C to accept a matrix and determine whether it is a sparse matrix.

Sol – 9.

#include<stdio.h>

#include<conio.h>

int main()

{

int i,j,row,column,count=0;

printf("Enter no. of rows in matrix : ");

scanf("%d",&row);

printf("Enter no. of columns in matrix : ");

scanf("%d",&column);

int a[row][column];

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

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

{

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

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

}

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

{

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

if(a[i][j]==0)

count++;

}

if(count>=row\*column/2.0)

printf("Matrix is Sparse");

else

printf("Matrix is not Sparse");

getch();

return 0;

}

1. Write a program in C to find the row with maximum number of 1s.

Sol – 10.

#include<stdio.h>

#include<conio.h>

int main()

{

int i,j,row,column,count,g=-1;

printf("Enter no. of rows in matrix : ");

scanf("%d",&row);

printf("Enter no. of columns in matrix : ");

scanf("%d",&column);

int a[row][column],b[row];

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

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

{

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

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

}

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

{

count=0;

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

if(a[i][j]==1)

count++;

b[i]=count;

}

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

g=g>b[i]?g:b[i];

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

if(g==b[i])

printf("\nHighest 1s containg row : %d",i+1);

getch();

return 0;

}