**Multi-Dimensional Array in C Language**

**Assignment - 16**

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

#include<stdio.h>

#include<string.h>

int main()

{

int str1[3][3],str2[3][3],add[3][3],i,j;

printf("Input elements in the matrix ONE :\n");

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

{

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

{

printf("element - [%d],[%d] : ",i,j);

scanf("%d",&str1[i][j]);

}

}

printf("Input elements in the matrix TWO :\n");

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

{

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

{

printf("element - [%d],[%d] : ",i,j);

scanf("%d",&str2[i][j]);

}

}

printf("\nThe matrix ONE is : \n");

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

{

printf("\n");

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

printf("%d\t",str1[i][j]);

}

printf("\n\n");

printf("\nThe matrix two is : \n");

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

{

printf("\n");

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

printf("%d\t",str2[i][j]);

}

printf("\nSUM OF 2 MATRIX IS=\n");

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

{

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

{

add[i][j]=str1[i][j]+str2[i][j];

}

}

printf("\nADDITION OF TWO matrix is : \n");

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

{

printf("\n");

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

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

}

return 0;

}

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

**#include<stdio.h>**

**int main()**

**{**

**int a[3][3],a2[3][3],mult[3][3],i,j,k;**

**printf("Input elements in the matrix ONE :\n");**

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

**{**

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

**{**

**printf("element - [%d],[%d] : ",i,j);**

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

**}**

**}**

**printf("Input elements in the matrix TWO :\n");**

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

**{**

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

**{**

**printf("element - [%d],[%d] : ",i,j);**

**scanf("%d",&a2[i][j]);**

**}**

**}**

**printf("\nThe matrix ONE is : \n");**

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

**{**

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

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

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

**}**

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

**printf("\nThe matrix two is : \n");**

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

**{**

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

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

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

**}**

**printf("\nmultiply of the matrix=\n");**

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

**{**

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

**{**

**mult[i][j]=0;**

**for(k=0;k<3;k++)**

**{**

**mult[i][j]+=a[i][k]\*a2[k][j];**

**}**

**}**

**}**

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

**{**

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

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

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

**}**

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

**}**

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

**#include<stdio.h>**

**#include<string.h>**

**int main()**

**{**

**int a1[3][3],i,j;**

**printf("Input elements in the matrix ONE :\n");**

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

**{**

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

**{**

**printf("element - [%d],[%d] : ",i,j);**

**scanf("%d",&a1[i][j]);**

**}**

**}**

**printf("\nThe matrix ONE is : \n");**

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

**{**

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

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

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

**}**

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

**printf("TRANSPOSE OF MATRIX");**

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

**{**

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

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

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

**}**

**return 0;**

**}**

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

**#include<stdio.h>**

**int main()**

**{**

**int a1[3][3],i,j,sum=0;**

**printf("Input elements in the matrix ONE :\n");**

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

**{**

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

**{**

**printf("element - [%d],[%d] : ",i,j);**

**scanf("%d",&a1[i][j]);**

**}**

**}**

**printf("\nThe matrix ONE is : \n");**

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

**{**

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

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

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

**}**

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

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

**{**

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

**{**

**if((i+j)==2)**

**{**

**sum=sum+a1[i][j];**

**}**

**}**

**}**

**printf("SUM OF RIGHT DIAGONAL=%d",sum);**

**return 0;**

**}**

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

**#include<stdio.h>**

**#include<string.h>**

**int main()**

**{**

**int a1[3][3],i,j,sum=0;**

**printf("Input elements in the matrix ONE :\n");**

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

**{**

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

**{**

**printf("element - [%d],[%d] : ",i,j);**

**scanf("%d",&a1[i][j]);**

**}**

**}**

**printf("\nThe matrix ONE is : \n");**

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

**{**

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

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

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

**}**

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

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

**{**

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

**{**

**if(i==j)**

**{**

**sum=sum+a1[i][j];**

**}**

**}**

**}**

**printf("SUM OF LEFT DIAGONAL=%d",sum);**

**return 0;**

**}**

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

**#include<stdio.h>**

**int main()**

**{**

**int a1[3][3],i,j,rowsum[3],colsum[3];**

**printf("Input elements in the matrix ONE :\n");**

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

**{**

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

**{**

**printf("element - [%d],[%d] : ",i,j);**

**scanf("%d",&a1[i][j]);**

**}**

**}**

**printf("\nThe matrix ONE is : \n");**

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

**{**

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

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

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

**}**

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

**printf("SUM OF ROWS\n");**

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

**{**

**rowsum[i]=0;**

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

**{**

**rowsum[i]=rowsum[i]+a1[i][j];**

**}**

**}**

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

**{**

**printf("%d ",rowsum[i]);**

**}**

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

**printf("SUM OF COLUMN\n");**

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

**{**

**colsum[i]=0;**

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

**{**

**colsum[i]=colsum[i]+a1[j][i];**

**}**

**}**

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

**{**

**printf("%d ",colsum[j]);**

**}**

**return 0;**

**}**

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

#include<stdio.h>

int main()

{

int a1[3][3],i,j,sum[3];

printf("Input elements in the matrix ONE :\n");

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

{

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

{

printf("element - [%d],[%d] : ",i,j);

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

}

}

printf("\nThe matrix ONE is : \n");

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

{

printf("\n");

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

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

}

printf("\n\n");

printf("UPPER TRIANGLE MATRIX=\n");

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

{

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

{

if(i>j)

printf("0");

else

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

printf(" ");

}

printf("\n");

}

}

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

#include<stdio.h>

int main()

{

int a1[3][3],i,j,sum[3];

printf("Input elements in the matrix ONE :\n");

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

{

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

{

printf("element - [%d],[%d] : ",i,j);

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

}

}

printf("\nThe matrix ONE is : \n");

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

{

printf("\n");

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

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

}

printf("\n\n");

printf("UPPER TRIANGLE MATRIX=\n");

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

{

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

{

if(i<j)

printf("0");

else

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

printf(" ");

}

printf("\n");

}

}

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

#include<stdio.h>

int main()

{

int a1[3][3],i,j,count=0;

printf("Input elements in the matrix ONE :\n");

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

{

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

{

printf("element - [%d],[%d] : ",i,j);

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

}

}

printf("\nThe matrix ONE is : \n");

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

{

printf("\n");

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

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

}

printf("\n\n");

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

{

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

{

if(a1[i][j]==0)

{

count=1;

}

}

}

if(count==1)

printf("SPARSE MATRIX");

else

printf("NOT A SPARSE MATRIX");

return 0;

}

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

#include<stdio.h>

int main()

{

int a1[3][3],i,j,rowmax1[3];

printf("Input elements in the matrix ONE :\n");

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

{

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

{

printf("element - [%d],[%d] : ",i,j);

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

}

}

printf("\nThe matrix ONE is : \n");

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

{

printf("\n");

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

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

}

printf("\n\n");

printf("MAX ROW HAVING 1\n");

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

{

rowmax1[i]=0;

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

{

if(a1[i][j]==1)

{

rowmax1[i]++;

}

}

}

int max=0;

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

{

if(rowmax1[max]<rowmax1[i])

max=i;

}

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

{

printf("%d\t",a1[max][i]);

}

return 0;

}