Assignment - 16

Multi-Dimensional Array in C Language

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

Code

#include <stdio.h>

int main()

{

    int a[3][3], b[3][3], c[3][3];

    int i, j;

     printf("Enter first matrix 3x3:\n");

    for (i = 0; i < 3; i++)

        for (j = 0; j < 3; j++)

            scanf("%d", &a[i][j]);

  printf("Enter second matrix 3x3:\n");

    for (i = 0; i < 3; i++)

        for (j = 0; j < 3; j++)

            scanf("%d", &b[i][j]);

    for (i = 0; i < 3; i++)

        for (j = 0; j < 3; j++)

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

    printf("Addition of matrix 3x3 :\n");

    for (i = 0; i < 3; i++)

    {

        for (j = 0; j < 3; j++)

        {

            printf(" %d ", c[i][j]);

        }

        printf("\n");

    }

    return 0;

}

Output

Enter first matrix :

1 1 1 1 1 1 1 1 1

Enter second matrix :

1 1 1 1 1 1 1 1 1

Addition of matrix :

2 2 2

2 2 2

2 2 2

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

Code

#include <stdio.h>

int main()

{

    int a[3][3], b[3][3], c[3][3];

    int i, j,k;

     printf("Enter first matrix 3x3:\n");

    for (i = 0; i < 3; i++)

        for (j = 0; j < 3; j++)

            scanf("%d", &a[i][j]);

  printf("Enter second matrix 3x3:\n");

    for (i = 0; i < 3; i++)

        for (j = 0; j < 3; j++)

            scanf("%d", &b[i][j]);

     for (i = 0; i < 3; i++)

        for (j = 0; j < 3; j++)

          c[i][j]=0;

          // put all values of c matrix to zero

    for (i = 0; i < 3; i++)

        for (j = 0; j < 3; j++)

            for(k=0;k<3;k++)

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

     printf("multipication of matrix 3x3 :\n");

    for (i = 0; i < 3; i++)

    {

        for (j = 0; j < 3; j++)

         printf(" %d ", c[i][j]);

        printf("\n");

    }

    return 0;

}

Output

Enter first matrix 3x3:

1 1 1 2 2 2 3 3 3

Enter second matrix 3x3:

1 1 1 2 2 2 3 3 3

multipication of matrix 3x3 :

6 6 6

12 12 12

18 18 18

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

Code

#include <stdio.h>

int main()

{

    int a[3][3], b[3][3];

    int i, j;

     printf("Enter first matrix 3x3:\n");

    for (i = 0; i < 3; i++)

        for (j = 0; j < 3; j++)

            scanf("%d", &a[i][j]);

  printf("Entered matrix 3x3:\n");

    for (i = 0; i < 3; i++)

    {

        for (j = 0; j < 3; j++)

        printf(" %d ",a[i][j]);

         printf("\n");

    }

    for (i = 0; i < 3; i++)

        for (j = 0; j < 3; j++)

             b[i][j] = a[j][i];

    printf("Transpose of matrix 3x3 :\n");

    for (i = 0; i < 3; i++)

    {

        for (j = 0; j < 3; j++)

        {

            printf(" %d ", b[i][j]);

        }

        printf("\n");

    }

    return 0;

}

Output

Enter first matrix 3x3:

1 1 1 2 2 2 3 3 3

Entered matrix 3x3:

1 1 1

2 2 2

3 3 3

Transpose of matrix 3x3 :

1 2 3

1 2 3

1 2 3

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

Code

#include <stdio.h>

int main()

{

    int a[3][3],c=0;

    int i, j;

     printf("Enter first matrix 3x3:\n");

    for (i = 0; i < 3; i++)

        for (j = 0; j < 3; j++)

            scanf("%d", &a[i][j]);

  printf("Entered matrix 3x3:\n");

    for (i = 0; i < 3; i++)

    {

        for (j = 0; j < 3; j++)

        printf(" %d ",a[i][j]);

         printf("\n");

    }

    for (i = 0; i < 3; i++)

        for (j = 0; j < 3; j++)

            if(i==j)

            c= c+ a[i][j];

    printf("sum of right diagonal matrix 3x3 : %d ",c);

    return 0;

}

Output

Enter first matrix 3x3:

2 3 4 6 3 2 4 4 6

Entered matrix 3x3:

2 3 4

6 3 2

4 4 6

sum of right diagonal matrix 3x3 : 11

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

Code

#include <stdio.h>

int main()

{

    int a[3][3],s=0;

    int i, j;

    int r,c;

     printf("Enter rows of matrix :\n");

     scanf("%d",&r);

     printf("Enter column of matrix :\n");

     scanf("%d",&c);

     printf("Enter matrix :\n");

    for (i = 0; i < r; i++)

        for (j = 0; j < c; j++)

            scanf("%d", &a[i][j]);

  printf("Entered matrix :\n");

    for (i = 0; i < r; i++)

    {

        for (j = 0; j < c; j++)

        printf(" %d ",a[i][j]);

         printf("\n");

    }

    for (i = 0; i < r; i++)

        for (j = 0; j < c; j++)

            if(i+j==r-1)

            s= s+ a[i][j];

    printf("sum of left diagonal matrix 3x3 : %d ",s);

    return 0;

}

Output

Enter rows of matrix :

2

Enter column of matrix :

3

Enter matrix :

1 1 1 5 6 8

Entered matrix :

1 1 1

5 6 8

sum of left diagonal matrix 3x3 : 6

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

Code

#include <stdio.h>

int main()

{

    int a[3][3],s=0;

    int i, j;

    int r,c;

     printf("Enter rows of matrix :\n");

     scanf("%d",&r);

     printf("Enter column of matrix :\n");

     scanf("%d",&c);

     printf("Enter matrix :\n");

    for (i = 0; i < r; i++)

        for (j = 0; j < c; j++)

            scanf("%d", &a[i][j]);

  printf("Entered matrix :\n");

    for (i = 0; i < r; i++)

    {

        for (j = 0; j < c; j++)

        printf(" %d ",a[i][j]);

         printf("\n");

    }

    for (i = 0; i < r; i++)

        for (j = 0; j < c; j++)

            s= s+ a[i][j];

    printf("sum of rows and colums of matrix 3x3 : %d ",s);

    return 0;

}

Output

Enter rows of matrix :

3

Enter column of matrix :

3

Enter matrix :

1 1 1 1 1 1 1 1 1

Entered matrix :

1 1 1

1 1 1

1 1 1

sum of rows and colums of matrix 3x3 : 9

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

Code

#include <stdio.h>

int main()

{

    int a[3][3],s=0;

    int i, j;

    int r,c;

     printf("Enter rows of matrix :\n");

     scanf("%d",&r);

     printf("Enter column of matrix :\n");

     scanf("%d",&c);

     printf("Enter matrix :\n");

    for (i = 0; i < r; i++)

        for (j = 0; j < c; j++)

            scanf("%d", &a[i][j]);

  printf("Entered matrix :\n");

    for (i = 0; i < r; i++)

    {

        for (j = 0; j < c; j++)

        printf(" %d ",a[i][j]);

         printf("\n");

    }

    for (i = 0; i < r; i++)

        for (j = 0; j < c; j++)

            if(i<j )

            a[i][j]=0;

    printf("lower Triangular matrix :\n");

    for (i = 0; i < r; i++)

    {

        for (j = 0; j < c; j++)

            printf(" %d ",a[i][j]);

            printf("\n");

    }

    return 0;

}

Output

Enter rows of matrix :

3

Enter column of matrix :

3

Enter matrix :

1 2 3 4 5 6 7 8 9

Entered matrix :

1 2 3

4 5 6

7 8 9

lower Triangular matrix :

1 0 0

4 5 0

7 8 9

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

Code

#include <stdio.h>

int main()

{

    int a[3][3],s=0;

    int i, j;

    int r,c;

     printf("Enter rows of matrix :\n");

     scanf("%d",&r);

     printf("Enter column of matrix :\n");

     scanf("%d",&c);

     printf("Enter matrix :\n");

    for (i = 0; i < r; i++)

        for (j = 0; j < c; j++)

            scanf("%d", &a[i][j]);

  printf("Entered matrix :\n");

    for (i = 0; i < r; i++)

    {

        for (j = 0; j < c; j++)

        printf(" %d ",a[i][j]);

         printf("\n");

    }

    for (i = 0; i < r; i++)

        for (j = 0; j < c; j++)

            if(i>j )

            a[i][j]=0;

    printf("lower Triangular matrix :\n");

    for (i = 0; i < r; i++)

    {

        for (j = 0; j < c; j++)

            printf(" %d ",a[i][j]);

            printf("\n");

    }

    return 0;

}

Output

Enter rows of matrix :

3

Enter column of matrix :

3

Enter matrix :

1 2 3 4 5 6 7 8 9

Entered matrix :

1 2 3

4 5 6

7 8 9

lower Triangular matrix :

1 2 3

0 5 6

0 0 9

.

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

Code

#include <stdio.h>

int main()

{

    int a[3][3],count=0;

    int i, j;

    int r,c;

     printf("Enter rows of matrix :\n");

     scanf("%d",&r);

     printf("Enter column of matrix :\n");

     scanf("%d",&c);

     printf("Enter matrix :\n");

    for (i = 0; i < r; i++)

        for (j = 0; j < c; j++)

            scanf("%d", &a[i][j]);

  printf("Entered matrix :\n");

    for (i = 0; i < r; i++)

    {

        for (j = 0; j < c; j++)

        printf(" %d ",a[i][j]);

         printf("\n");

    }

    for (i = 0; i < r; i++)

        for (j = 0; j < c; j++)

            if(a[i][j]==0 )

              count++;

      if(count>((r\*c)/2))

     printf("The given matrix is sprase matrix");

     else

      printf("The given matrix is not sprase matrix");

    return 0;

}

Output

Enter rows of matrix :

3

Enter column of matrix :

3

Enter matrix :

1 0 0 0 3 0 0 0 0

Entered matrix :

1 0 0

0 3 0

0 0 0

The given matrix is sprase matrix

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

Code

#include <stdio.h>

int main()

{

    int a[3][3],count=0;

    int i, j,k;

    int r,c;

     printf("Enter rows of matrix :\n");

     scanf("%d",&r);

     printf("Enter column of matrix :\n");

     scanf("%d",&c);

     printf("Enter matrix :\n");

    for (i = 0; i < r; i++)

        for (j = 0; j < c; j++)

            scanf("%d", &a[i][j]);

  printf("Entered matrix :\n");

    for (i = 0; i < r; i++)

    {

        for (j = 0; j < c; j++)

        printf(" %d ",a[i][j]);

         printf("\n");

    }

    for (i = 0; i < r; i++)

    {

         count=0;

        for (j = 0; j < c; j++)

        {

       if(a[i][j]==1)

       {

        count++;

       }

        }

         printf("number of 1s in %d row is : %d \n",i,count);

    }

    return 0;

}

Output

Enter rows of matrix :

3

Enter column of matrix :

3

Enter matrix :

1 0 1 1 1 1 0 0 1

Entered matrix :

1 0 1

1 1 1

0 0 1

number of 1s in 0 row is : 2

number of 1s in 1 row is : 3

number of 1s in 2 row is : 1