Multi-Dimensional Array in C Language
Assignment:-16

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

Ans:-

```
#include<stdio.h>
int main()
{
   int a[3][3]={40,40,60,30,70,40,25,50,55};
   int b[3][3]={55,65,78,40,65,35,42,65,70};
   int c[3][3]={0},i,j;
   for(i=0;i<3;i++)
   {
      for(j=0;j<3;j++)
      {
         c[i][j]=a[i][j]+b[i][j];
         printf("%d ",c[i][j]);
      }
      printf("\n");
   }
   return 0;
}
```

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

Ans:-

```
#include<stdio.h>
int main()
{
   int a[3][3]={40,40,60,30,70,40,25,50,55};
   int b[3][3]={55,65,78,40,65,35,42,65,70};
   int c[3][3]={0},i,j,k;
   for(i=0;i<3;i++)
   {
      for(j=0;j<3;j++)
      {
         for(k=0;k<3;k++)
         {
            c[i][j]+=a[i][k]*b[k][j];
         }
         printf("%d ",c[i][j]);
      }
      printf("\n");
   }
   return 0;
}
```

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

Ans:-

```
#include<stdio.h>
int main()
{
   int a[3][3]={
                {40,40,60},
                {30,70,40},
                {25,50,55}
               };
   int i,j;
   for(i=0;i<2;i++)
   {
       for(j=i;j<3;j++)
         a[j][i]=(a[i][j]+a[j][i])-(a[i][j]=a[j][i]);
   }
   for(i=0;i<3;i++)
   {
       for(j=0;j<3;j++)
         printf("%d ",a[i][j]);
       printf("\n");
   }
   return 0;
}
```

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

Ans:-

```
#include<stdio.h>
int main()
{
   int a[3][3]={
                {40,40,60},
                {30,70,40},
                {25,50,55}
               };
   int i,j,sum=0;
   for(i=0;i<3;i++)
       for(j=0;j<3;j++)
          if(i==2-j)
            sum=sum+a[i][j];
   printf("Sum of right diagonals of a matrix is=%d",sum);
   return 0;
}
```

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

Ans:-

```
#include<stdio.h>
int main()
{
   int a[3][3]={
```

```
            {40,40,60},
            {30,70,40},
            {25,50,55}
          };
  int i,j,sum=0;
  for(i=0;i<3;i++)
     for(j=0;j<3;j++)
        if(i==j)
          sum=sum+a[i][j];
  printf("Sum of left diagonals of a matrix is=%d",sum);
  return 0;
}
```

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

Ans:-

```
#include<stdio.h>
int main()
{
  int a[3][3]={
            {40,40,60},
            {30,70,40},
            {25,50,55}
          };
  int i,j,sumr=0,sumc=0;
  for(i=0;i<3;i++)
  {
     for(j=0;j<3;j++)
          {
            sumr=sumr+a[i][j];
            sumc=sumc+a[j][i];
          }
     printf("Sum of %d row is =%d \nSum of %d column is =%d\n",i+1,sumr,i+1,sumc);
     sumr=sumc=0;
  }
  return 0;
}
```

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

Ans:-

```
#include<stdio.h>
int main()
{
  int a[3][3]={
            {40,0,0},
            {78,70,0},
            {87,86,55}
          };
  int i,j;
  printf("Display an lower triangular matrix----------\n");
```

```
   for(i=0;i<3;i++)
   {
      for(j=0;j<3;j++)
            {
               if(i==j || j<i)
                 printf("%4d",a[i][j]);
               else
                 printf("    ");
            }
      printf("\n");
   }
   return 0;
}
```

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

Ans:-

```
#include<stdio.h>
int main()
{
   int a[3][3]={
              {40,40,60},
              {0,70,40},
              {0,0,55}
             };
   int i,j;
   printf("Display an upper triangular matrix----------\n");
   for(i=0;i<3;i++)
   {
      for(j=0;j<3;j++)
            {
               if(i==j || j>i)
                 printf("%4d",a[i][j]);
               else
                 printf("    ");
            }
      printf("\n");
   }
   return 0;
}
```

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

Ans:-

```
#include <stdio.h>
int main()
{
   int count=0,i,j;
   int a[3][3] = {
              {4, 0, 0},
              {0, 9, 0},
```

```
            {0, 0, 7}
          };
  for(i=0;i<3;i++)
    for(j=0;j<3;j++)
      if(a[i][j]==0)
        count++;
  if(count>(3*3/2))
    printf("Given matrix is a sparse matrix");
  else
    printf("Given matrix is not a sparse matrix");
  return 0;
}
```

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

Ans:-

```
#include <stdio.h>
int main()
{
  int count=0,i,j,maxCount=0,indexofrow;
  int a[3][3] = {
            {1, 0, 0},
            {0, 1, 1},
            {1, 1, 1}
          };
  for(i=0;i<3;i++)
  {
    count=0 ;
    for(j=0;j<3;j++ )
      if(a[i][j]==1)
        count++ ;
    if(count>maxCount)
    {
      maxCount=count ;
      indexofrow=i ;
    }
  }
  printf("Row number with maximum 1s is %d",indexofrow);
  return 0;
}
```