Name:	Omkar Deshmukh
UID:	2021700018
Branch:	CSE(DS)D1
Exp:	3

Aim:- To find multiplication of two matrix by strassen's matrix multiplication algorithm.

1)Algorithm:-

Algorithm Strass(n, x, y, z)

begin

If n = threshold then compute C = x * y is a conventional matrix.

Else

Partition a into four sub matrices a00, a01, a10, a11.

Partition b into four sub matrices b00, b01, b10, b11.

Strass (n/2, a00 + a11, b00 + b11, d1)

Strass (n/2, a10 + a11, b00, d2)

Strass (n/2, a00, b01 – b11, d3)

Strass (n/2, a11, b10 – b00, d4)

Strass (n/2, a00 + a01, b11, d5)

Strass (n/2, a10 – a00, b00 + b11, d6)

Strass (n/2, a01 – a11, b10 + b11, d7)

C = d1+d4-d5+d7 d3+d5 d2+d4 d1+d3-d2-d6

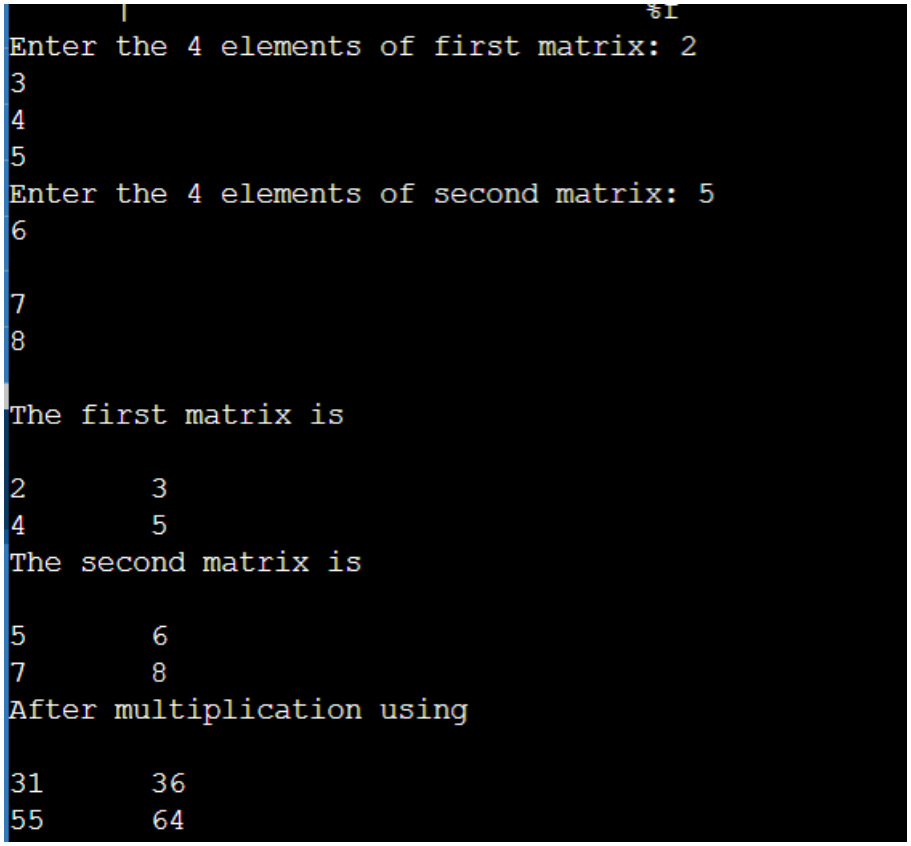
end if return (C) end.

2)Program:-

```
#include<stdio.h> int main(){
int a[2][2],b[2][2],c[2][2]; int
m1,m2,m3,m4,m5,m6,m7;
```

```
  printf("Enter the 4 elements of first matrix: "); for(int
  i=0;i<2;i++) for(int j=0;j<2;j++) scanf("%d",&a[i][j]);

  printf("Enter the 4 elements of second matrix: "); for( int
  i=0;i<2;i++) for(int j=0;j<2;j++) scanf("%d",&b[i][j]);

  printf("\nThe first matrix is\n"); for(int
  i=0;i<2;i++){ printf("\n"); for(int j=0;j<2;j++)
  printf("%d\t",a[i][j]);
  }

  printf("\nThe second matrix is\n"); for(int
  i=0;i<2;i++){ printf("\n"); for(int j=0;j<2;j++)
  printf("%d\t",b[i][j]);
  }

  m1= (a[0][0] + a[1][1])*(b[0][0]+b[1][1]); m2=
  (a[1][0]+a[1][1])*b[0][0]; m3= a[0][0]*(b[0][1]-
  b[1][1]); m4= a[1][1]*(b[1][0]-b[0][0]); m5=
  (a[0][0]+a[0][1])*b[1][1]; m6= (a[1][0]-
  a[0][0])*(b[0][0]+b[0][1]); m7= (a[0][1]-
  a[1][1])*(b[1][0]+b[1][1]);

  c[0][0]=m1+m4-m5+m7; c[0][1]=m3+m5;
  c[1][0]=m2+m4; c[1][1]=m1-m2+m3+m6;

printf("\nAfter multiplication using \n"); for(int i=0;i<2;i++){
       printf("\n"); for(int j=0;j<2;j++)
       printf("%d\t",c[i][j]);
    }

    return 0;
}
```

Output:-



Conclusion:-In this experiment, I have learned how strassens multiplication is working in divide and conquer method. Strassen's Matrix Multiplication has a complexity of around n^2.81 whereas usual multiplication's complexity is n^3.

Also I have learned the advantages of strassens matrix multiplication.