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Experiment No.	3

Aim: Experiment on performing Strassen's matrix multiplication.

Theory:

Strassen's algorithm is an efficient way to multiply two matrices. It is based on a divide-and-conquer approach and was developed by Volker Strassen in 1969.

The basic idea behind the Strassen's algorithm is to divide the two matrices to be multiplied into smaller sub-matrices, and then recursively compute the product of these sub-matrices. This leads to a reduction in the number of multiplications required to compute the product, and hence improves the overall efficiency of the multiplication.

Algorithm:

1. Start by taking the input of the two matrices A and B from the user.
2. Then find s1 till s10 with the given formulas.
3. Using these, compute p1 till p7.
4. Then define the output of product matrix C

Code:

```
#include <bits/stdc++.h>
using namespace std;
```

```
int main()
```

```
{
    int a[2][2],b[2][2],c[2][2];
```

```
    cout<<"Enter the elements of 2x2 Matrix A:\n";
    for(int i=0;i<2;i++)
    {
        for(int j=0;j<2;j++)
            cin>>a[i][j];
    }
```

```
    cout<<"Enter the elements of 2x2 Matrix B:\n";
    for(int i=0;i<2;i++)
    {
        for(int j=0;j<2;j++)
            cin>>b[i][j];
    }
```

```
    int s1=b[0][1]-b[1][1];
    int s2=a[0][0]+a[0][1];
    int s3=a[1][0]+a[1][1];
    int s4=b[1][0]-b[0][0];
    int s5=a[0][0]+a[1][1];
    int s6=b[0][0]+b[1][1];
    int s7=a[0][1]-a[1][1];
    int s8=b[1][0]+b[1][1];
    int s9=a[0][0]-a[1][0];
```

```

int s10=b[0][0]+b[0][1];

int p1=a[0][0]*s1;
int p2=b[1][1]*s2;
int p3=b[0][0]*s3;
int p4=a[1][1]*s4;
int p5=s5*s6;
int p6=s7*s8;
int p7=s9*s10;

c[0][0]=p5+p4-p2+p6;
c[0][1]=p1+p2;
c[1][0]=p3+p4;
c[1][1]=p5+p1-p3-p7;

cout<<"\nProduct of A and B is:\n";
for(int i=0;i<2;i++)
{
    for(int j=0;j<2;j++)
        cout<<c[i][j]<<" ";
    cout<<"\n";
}
}

```

Output:

```

Enter the elements of 2x2 Matrix A:
1 3
7 5
Enter the elements of 2x2 Matrix B:
6 8
4 2

Product of A and B is:
18 14
62 66

```

Conclusion: Successfully wrote a program to implement Strassen matrix multiplication.