Lab manual 9

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ME-15(A)

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List of all Global Functions

1. **void table**(int number, int n){

```
if(n>10){
        return;
}
cout<<number<<" x "<<n<<" = "<<number*n<<endl;
table(number,n+1);
```

}

2. **void matrix_multiplication**(int matrix1[3][3],int matrix2[3][3]){

```
int sum;
for(int i=0;i<3;i++){
        for(int j=0;j<3;j++){
                sum=0;
                for(int k=0;k<3;k++){
                        sum=sum+(matrix1[i][k]*matrix2[k][j]);
                }

                cout<<sum<<" ";
        }
        cout<<endl;
}
```

}

3. **void array2display**(int matrix2[3][3]){

```
for(int i=0;i<3;i++){
        for(int j=0;j<3;j++){
                cout<<matrix2[i][j]<<" ";
        }
```

```
            cout<<endl;
        }
}
```

4. **void array1display**(int matrix1[3][3]){

```
    for(int i=0;i<3;i++){
            for(int j=0;j<3;j++){
                cout<<matrix1[i][j]<<" ";
            }
            cout<<endl;
    }
}
```

5. **void array2** (int matrix2[3][3]){

```
    cout<<"Enter the elements into the second array.\n";
    for(int i=0;i<3;i++){
            for(int j=0;j<3;j++){
                cin>>matrix2[i][j];
            }
    }
}
```

6. **void array1** (int matrix1[3][3]){

```
    cout<<"Enter the elements into the array.\n";
    for(int i=0;i<3;i++){
            for(int j=0;j<3;j++){
                cin>>matrix1[i][j];
            }
    }
    }
```

7. **void transpose**(int matrix1[3][3],int matrix2[3][3]){

```
for(int i=0;i<3;i++){
        for(int j=0;j<3;j++){
                matrix1[i][j]=matrix2[j][i];
                cout<<matrix1[i][j]<<" ";
        }
        cout<<endl;
}
```

}

8. **void matrix_sum**(int matrix1[3][3], int matrix2[3][3]){

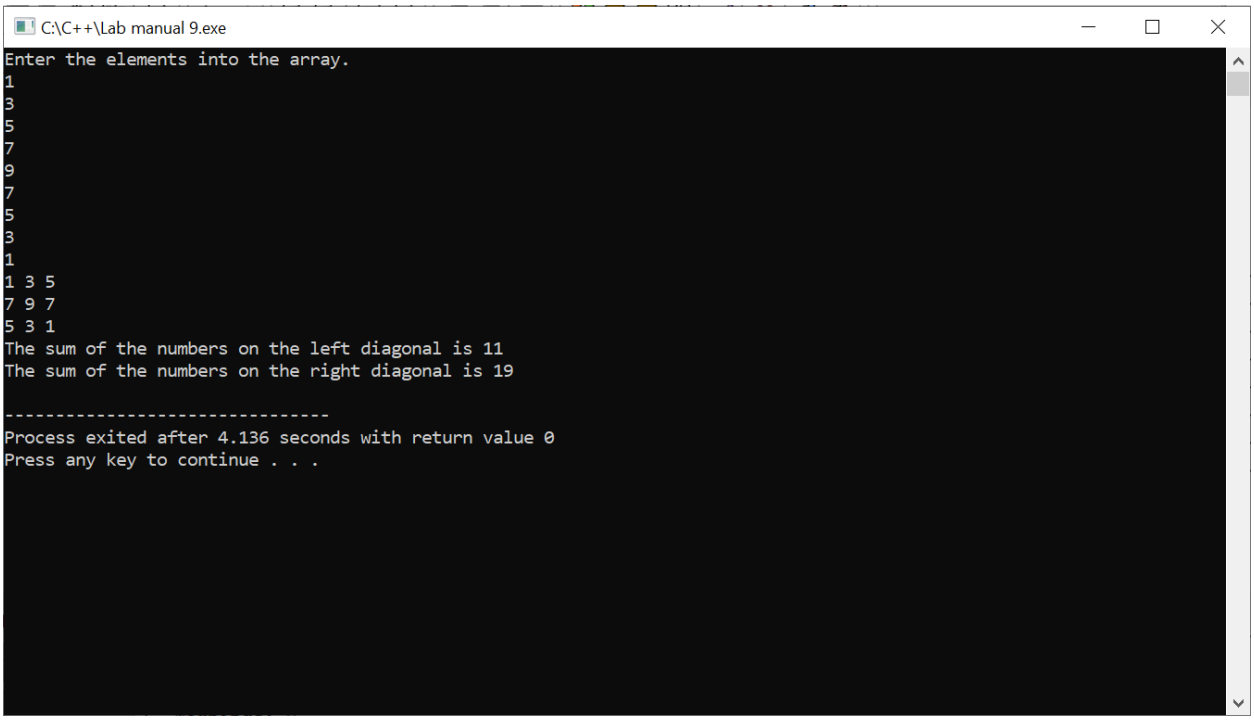
```
for (int i=0;i<3;i++){
        for(int j=0;j<3;j++){
                cout<<matrix1[i][j]+matrix2[i][j]<<" ";
        }
        cout<<endl;
}
```

}

9. ***int matrix1[3][3]*** (Global variable)
10. ***int matrix2[3][3]*** (Global variable)

1. Make 2D Array in C++ and print left diagonal and right diagonal sum of a 3x3 matrix.

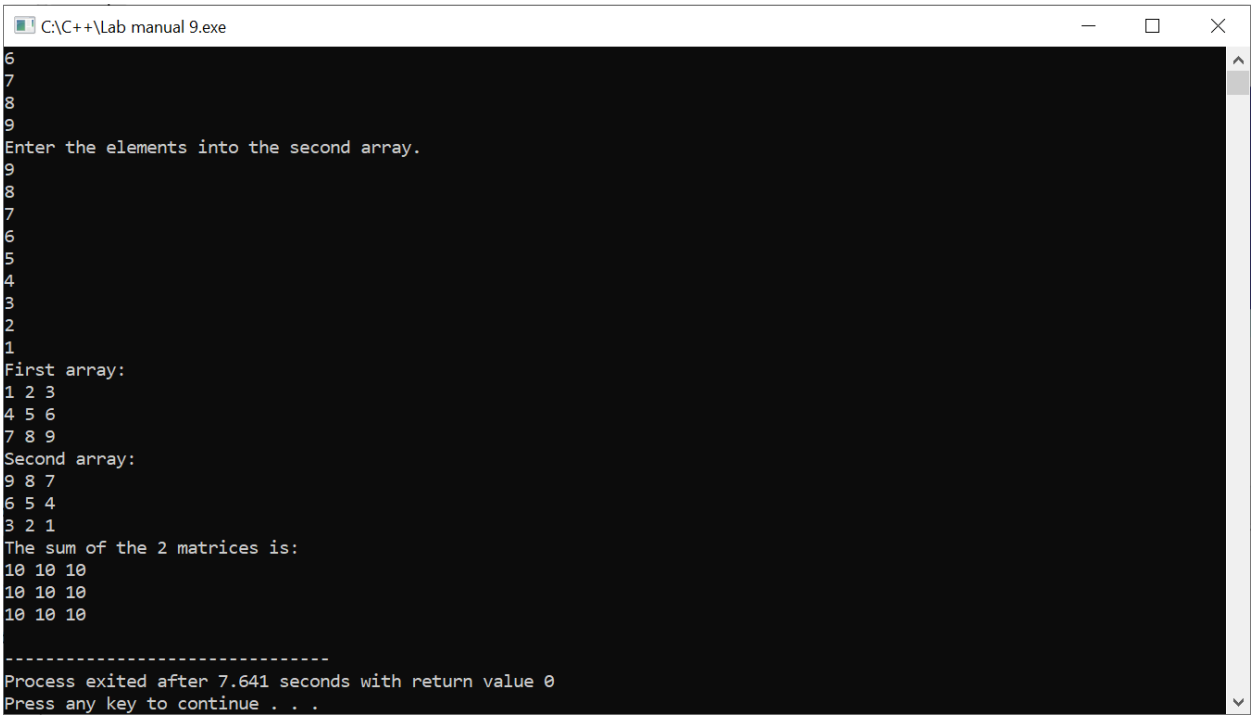
```
int sum=0;
array1(matrix1);
for (int i=0;i<3;i++){
        for(int j=0;j<3;j++){
                if(i==j){
                        sum=sum+matrix1[i][j];
                }
        }
}
for(int i=0;i<3;i++){
        for(int j=0;j<3;j++){
                cout<<matrix1[i][j]<<" ";
        }
        cout<<endl;
}
cout<<"The sum of the numbers on the left diagonal is "<<sum<<endl;
sum=0;
for (int i=0;i<3;i++){
        for(int j=0;j<3;j++){
                if(abs(i-j)==2||i+j==2){
                        sum+=matrix1[i][j];
                }
        }
}
cout<<"The sum of the numbers on the right diagonal is "<<sum<<endl;
```


C:\C++\Lab manual 9.exe
Enter the elements into the array.
1
3
5
7
9
7
5
3
1
1 3 5
7 9 7
5 3 1
The sum of the numbers on the left diagonal is 11
The sum of the numbers on the right diagonal is 19

Process exited after 4.136 seconds with return value 0
Press any key to continue . . .

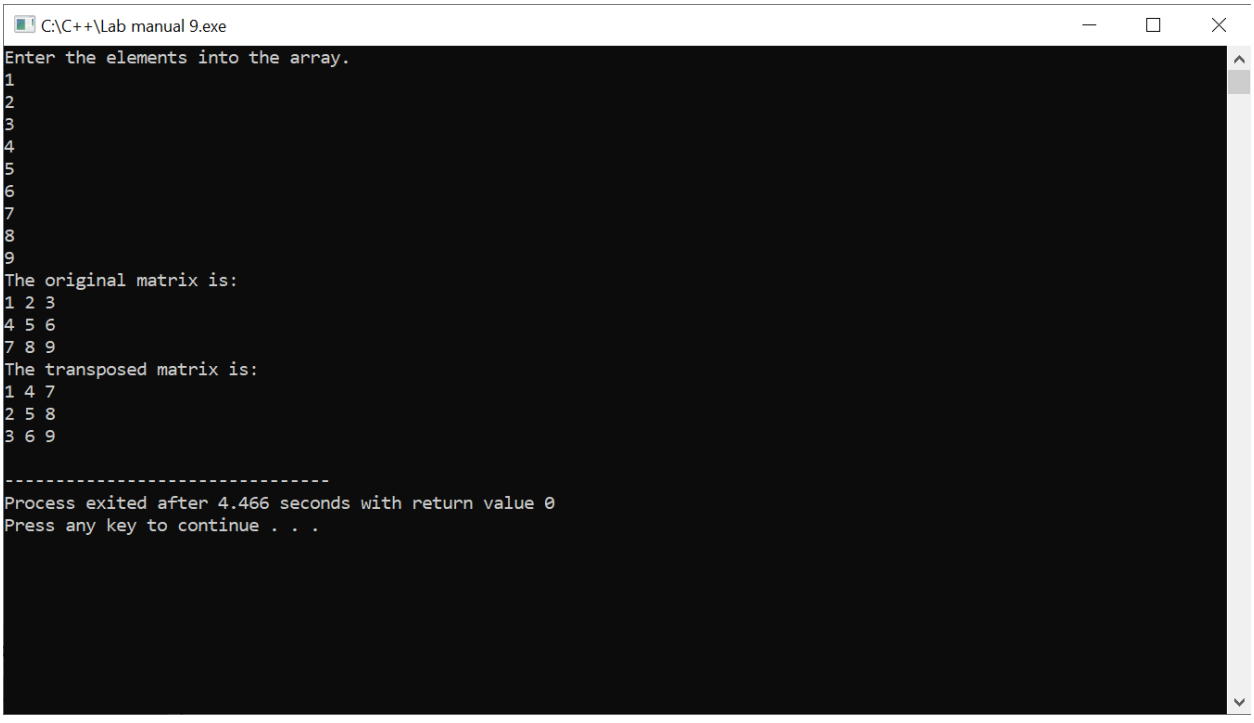
2. Write a function to add two 2D arrays of size 3x3.

```
array1(matrix1);
array2(matrix2);
cout<<"First array:\n";
array1display(matrix1);
cout<<"Second array:\n";
array2display(matrix2);
cout<<"The sum of the 2 matrices is: "<<endl;
matrix_sum(matrix1,matrix2);
```



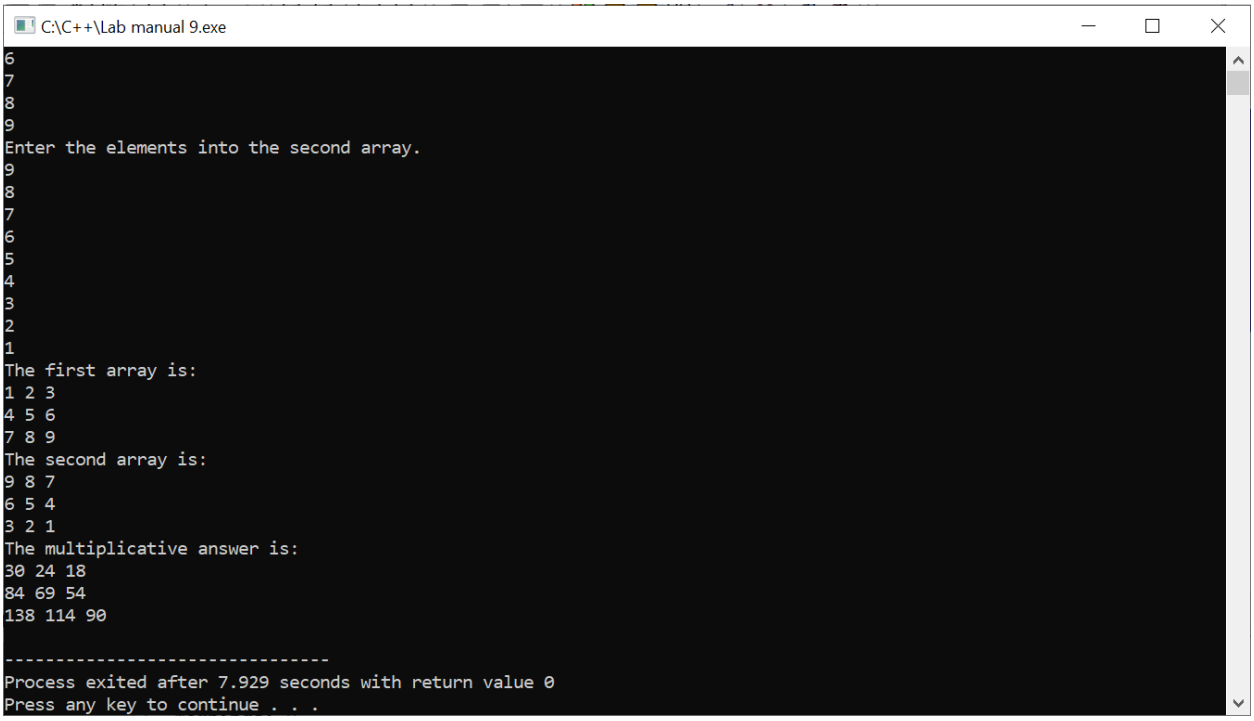
3. Using 2D arrays in C++, take transpose of a 3x3 matrix. Make a transpose function.

```
int copy_array[3][3];
array1(matrix1);
for(int i=0;i<3;i++){
        for(int j=0;j<3;j++){
                copy_array[i][j]=matrix1[i][j];
        }
}
cout<<"The original matrix is: \n";
array1display(matrix1);
cout<<"The transposed matrix is: \n";
transpose(matrix1,copy_array);
```



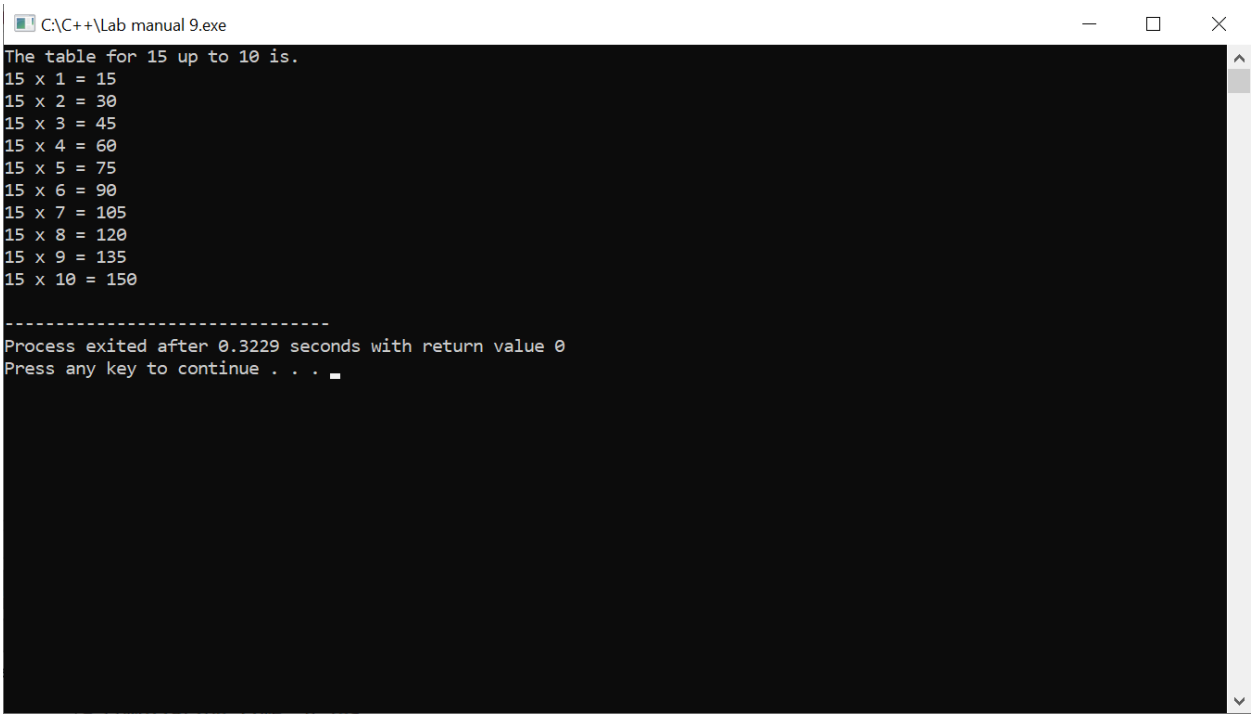
4. Using 2D arrays in C++, implement 3x3 matrix multiplication. Make a function.

```
int sum;
        array1(matrix1);
        array2(matrix2);
        cout<<"The first array is:\n";
        array1display(matrix1);
        cout<<"The second array is:\n";
        array2display(matrix2);
        cout<<"The multiplicative answer is: \n";
        matrix_multiplication(matrix1,matrix2);
```



5. Print the multiplication table of 15 using recursion.

```
int num=15;
cout<<"The table for 15 up to 10 is.\n";
table(num,1)
```



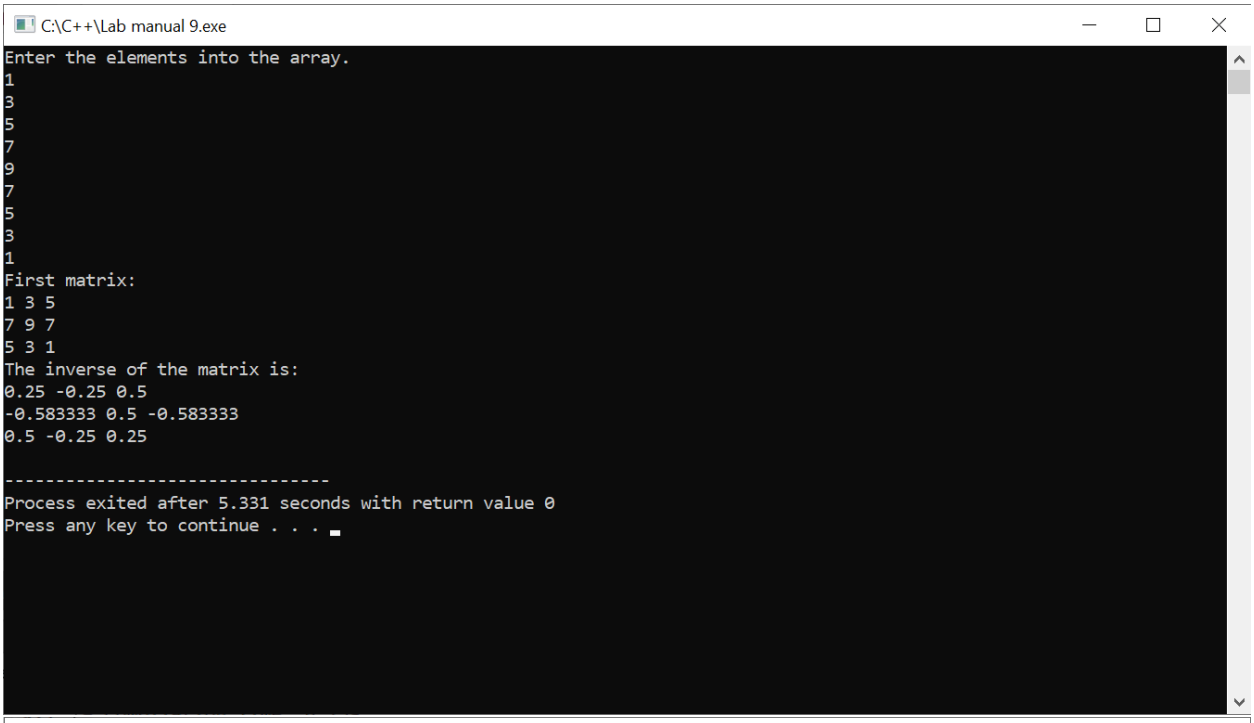
HOME TASK

Write a C++ program to take inverse of a 3x3 matrix using its determinant and adjoint.

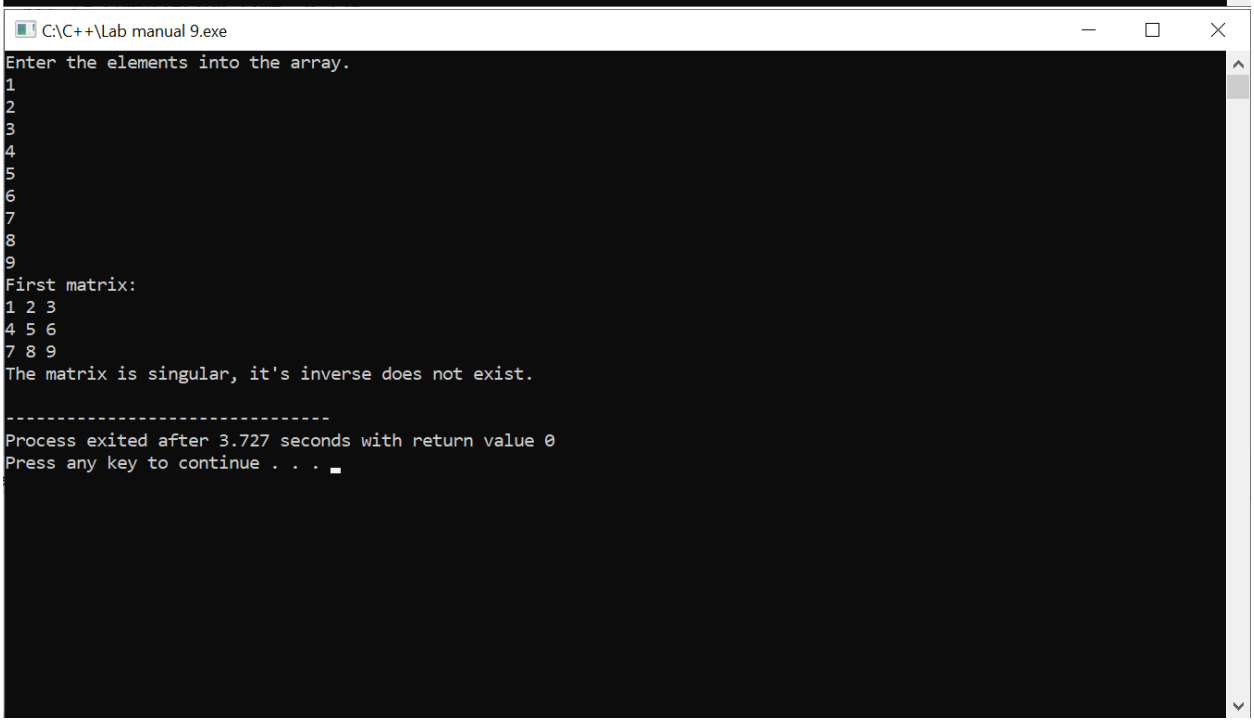
```
float adjoint[3][3],inverse[3][3];
array1(matrix1);
cout<<"First matrix: \n";
array1display(matrix1);
float determinant =
matrix1[0][0] * (matrix1[1][1] * matrix1[2][2] - matrix1[2][1] * matrix1[1][2]) -
matrix1[0][1] * (matrix1[1][0] * matrix1[2][2] - matrix1[2][0] * matrix1[1][2]) +
matrix1[0][2] * (matrix1[1][0] * matrix1[2][1] - matrix1[2][0] * matrix1[1][1]);
if (determinant == 0) {
cout << "The matrix is singular, it\'s inverse does not exist." << endl;
}
else{
        for(int i=0; i<3; i++){
                for(int j=0; j<3; j++){
                adjoint[i][j] = (matrix1[(j+1)%3][(i+1)%3] * matrix1[(j+2)%3][(i+2)%3] -
                        matrix1[(j+1)%3][(i+2)%3] * matrix1[(j+2)%3][(i+1)%3]);
                }
        }
for (int i = 0; i < 3; ++i){
        for (int j = 0; j < 3; ++j){
                inverse[i][j] = adjoint[i][j] / determinant;
        }
}
cout << "The inverse of the matrix is:" << endl;
for (int i=0; i<3; i++) {
```

```
            for (int j=0; j<3; j++){
                cout << inverse[i][j] << " ";
            }
            cout << endl;
        }

}
```


C:\C++\Lab manual 9.exe
Enter the elements into the array.
1
3
5
7
9
7
5
3
1
First matrix:
1 3 5
7 9 7
5 3 1
The inverse of the matrix is:
0.25 -0.25 0.5
-0.583333 0.5 -0.583333
0.5 -0.25 0.25

Process exited after 5.331 seconds with return value 0
Press any key to continue . . .


C:\C++\Lab manual 9.exe
Enter the elements into the array.
1
2
3
4
5
6
7
8
9
First matrix:
1 2 3
4 5 6
7 8 9
The matrix is singular, it's inverse does not exist.

Process exited after 3.727 seconds with return value 0
Press any key to continue . . .