Fundamental of Programing

Lab Manual #9

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TASK 1:

```
#include<iostream>
using namespace std;

int main(){
int numbers[3][3];
int suml,sumr;
for(int i=0; i<3; i++){
	for(int j=0; j<3; j++){
		cout<<"Enter Value for Element "<<j<<" of "<<i<<" row: ";
		cin>>numbers[i][j];
	}
}

for(int i=0; i<3; i++){
	cout<<endl;
	for(int j=0; j<3; j++){
		cout<<numbers[i][j]<<" ";
	}
}
suml=numbers[0][0]+numbers[1][1]+numbers[2][2];
sumr=numbers[2][0]+numbers[1][1]+numbers[0][2];
cout<<endl<<endl;
cout<<"Sum for Left Diagonal is: "<<suml<<endl;
cout<<"Sum for Right Diagonal is: "<<sumr<<endl;
}
```

```
Enter Value for Element 0 of 0 row: 1
Enter Value for Element 1 of 0 row: 2
Enter Value for Element 2 of 0 row: 3
Enter Value for Element 0 of 1 row: 4
Enter Value for Element 1 of 1 row: 5
Enter Value for Element 2 of 1 row: 6
Enter Value for Element 0 of 2 row: 7
Enter Value for Element 1 of 2 row: 8
Enter Value for Element 2 of 2 row: 9

1 2 3
4 5 6
7 8 9

Sum for Left Diagonal is: 15
Sum for Right Diagonal is: 15

--------------------------------
Process exited after 6.806 seconds with return value 0
Press any key to continue . . .
```

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ME-15 SECTION A

TASK 2:

```
#include<iostream>
using namespace std;

int main(){
int x1[3][3], x2[3][3], sum[3][3];
int i, j;
cout<<"Enter the Values for Array 1: "<<endl;
for(i=0; i<3; i++){
        for(j=0; j<3; j++){
                cout<<"Enter Value for Element "<<j<<" of "<<i<<" row: ";
                cin>>x1[i][j];
        }
}
cout<<endl<<"Array 1 Filled! Now Input Array 2: "<<endl;
for(i=0; i<3; i++){
        for(j=0; j<3; j++){
                cout<<"Enter Value for Element "<<j<<" of "<<i<<" row: ";
                cin>>x2[i][j];
        }
}
for(i=0; i<3; i++){
        for(j=0; j<3; j++){
                sum[i][j]=x1[i][j]+x2[i][j];
        }
}
cout<<endl<<"The sum for both Arrays is: "<<endl;
for(i=0; i<3; i++){
        for(j=0; j<3; j++){
                cout<<sum[i][j]<<" ";
        }
        cout<<endl;
}
}
```

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```
Enter the Values for Array 1:
Enter Value for Element 0 of 0 row: 1
Enter Value for Element 1 of 0 row: 2
Enter Value for Element 2 of 0 row: 3
Enter Value for Element 0 of 1 row: 4
Enter Value for Element 1 of 1 row: 5
Enter Value for Element 2 of 1 row: 6
Enter Value for Element 0 of 2 row: 7
Enter Value for Element 1 of 2 row: 8
Enter Value for Element 2 of 2 row: 9

Array 1 Filled! Now Input Array 2:
Enter Value for Element 0 of 0 row: 9
Enter Value for Element 1 of 0 row: 8
Enter Value for Element 2 of 0 row: 7
Enter Value for Element 0 of 1 row: 6
Enter Value for Element 1 of 1 row: 5
Enter Value for Element 2 of 1 row: 4
Enter Value for Element 0 of 2 row: 3
Enter Value for Element 1 of 2 row: 2
Enter Value for Element 2 of 2 row: 1

The sum for both Arrays is:
10 10 10
10 10 10
10 10 10

--------------------------------
Process exited after 13.94 seconds with return value 0
Press any key to continue . . .
```

TASK 3:

```
#include<iostream>
using namespace std;

int main(){
int arr1[3][3], transpose[3][3];
int i,j;
for(i=0; i<3; i++){
        for(j=0; j<3; j++){
        cout<<"Enter Value for Element "<<j<<" of "<<i<<" row: ";
                cin>>arr1[i][j];
        }
}
for(int i=0; i<3; i++){
        cout<<endl;
        for(int j=0; j<3; j++){
                cout<<arr1[i][j]<<" ";
```

```
        }
}
cout<<endl;
for(i=0; i<3; i++){
        for(j=0; j<3; j++){
                transpose[j][i]=arr1[i][j];
        }
}
cout<<endl<<"Transpose of Given Array is: "<<endl;
for(int i=0; i<3; i++){
        cout<<endl;
        for(int j=0; j<3; j++){
                cout<<transpose[i][j]<<" ";
        }
}
}
```

```
Enter Value for Element 0 of 0 row: 5
Enter Value for Element 1 of 0 row: 6
Enter Value for Element 2 of 0 row: 8
Enter Value for Element 0 of 1 row: 9
Enter Value for Element 1 of 1 row: 4
Enter Value for Element 2 of 1 row: 3
Enter Value for Element 0 of 2 row: 1
Enter Value for Element 1 of 2 row: 6
Enter Value for Element 2 of 2 row: 8

5 6 8
9 4 3
1 6 8

Transpose of Given Array is:

5 9 1
6 4 6
8 3 8
--------------------------------
Process exited after 7.004 seconds with return value 0
Press any key to continue . . .
```

TASK 4:

```
#include<iostream>
using namespace std;
```

```
int main(){
int x1[3][3], x2[3][3], multiple[3][3];
int i, j;
cout<<"Enter the Values for Array 1: "<<endl;
for(i=0; i<3; i++){
        for(j=0; j<3; j++){
                cout<<"Enter Value for Element "<<j<<" of "<<i<<" row: ";
                cin>>x1[i][j];
        }
}
cout<<endl<<"Array 1 Filled! Now Input Array 2: "<<endl;
for(i=0; i<3; i++){
        for(j=0; j<3; j++){
                cout<<"Enter Value for Element "<<j<<" of "<<i<<" row: ";
                cin>>x2[i][j];
        }
}
for ( i = 0; i < 3; i++) {
      for ( j = 0; j < 3; j++) {
         multiple[i][j] = 0;
         for (int k = 0; k < 3; ++k) {
            multiple[i][j] += x1[i][k] * x2[k][j];
         }
      }
   }
cout<<endl<<"Multiple of Given Array is: "<<endl;
for(int i=0; i<3; i++){
        cout<<endl;
        for(int j=0; j<3; j++){
                cout<<multiple[i][j]<<" ";
        }
}
}
```

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```
Enter the Values for Array 1:
Enter Value for Element 0 of 0 row: 1
Enter Value for Element 1 of 0 row: 6
Enter Value for Element 2 of 0 row: 4
Enter Value for Element 0 of 1 row: 9
Enter Value for Element 1 of 1 row: 8
Enter Value for Element 2 of 1 row: 5
Enter Value for Element 0 of 2 row: 3
Enter Value for Element 1 of 2 row: 14
Enter Value for Element 2 of 2 row: 5

Array 1 Filled! Now Input Array 2:
Enter Value for Element 0 of 0 row: 64
Enter Value for Element 1 of 0 row: 5
Enter Value for Element 2 of 0 row: 8
Enter Value for Element 0 of 1 row: 9
Enter Value for Element 1 of 1 row: 12
Enter Value for Element 2 of 1 row: 34
Enter Value for Element 0 of 2 row: 6
Enter Value for Element 1 of 2 row: 16
Enter Value for Element 2 of 2 row: 2

Multiple of Given Array is:

142 141 220
678 221 354
348 263 510
--------------------------------
Process exited after 18.09 seconds with return value 0
Press any key to continue . . .
```

TASK 5:

```
#include <iostream>

using namespace std;

void multiplication(int number, int multiplier = 1) {
   if (multiplier <= 10) {
      int result = number * multiplier;
      cout << number << " x " << multiplier << " = " << result << endl;
      multiplication(number, multiplier + 1);
   }
}
```

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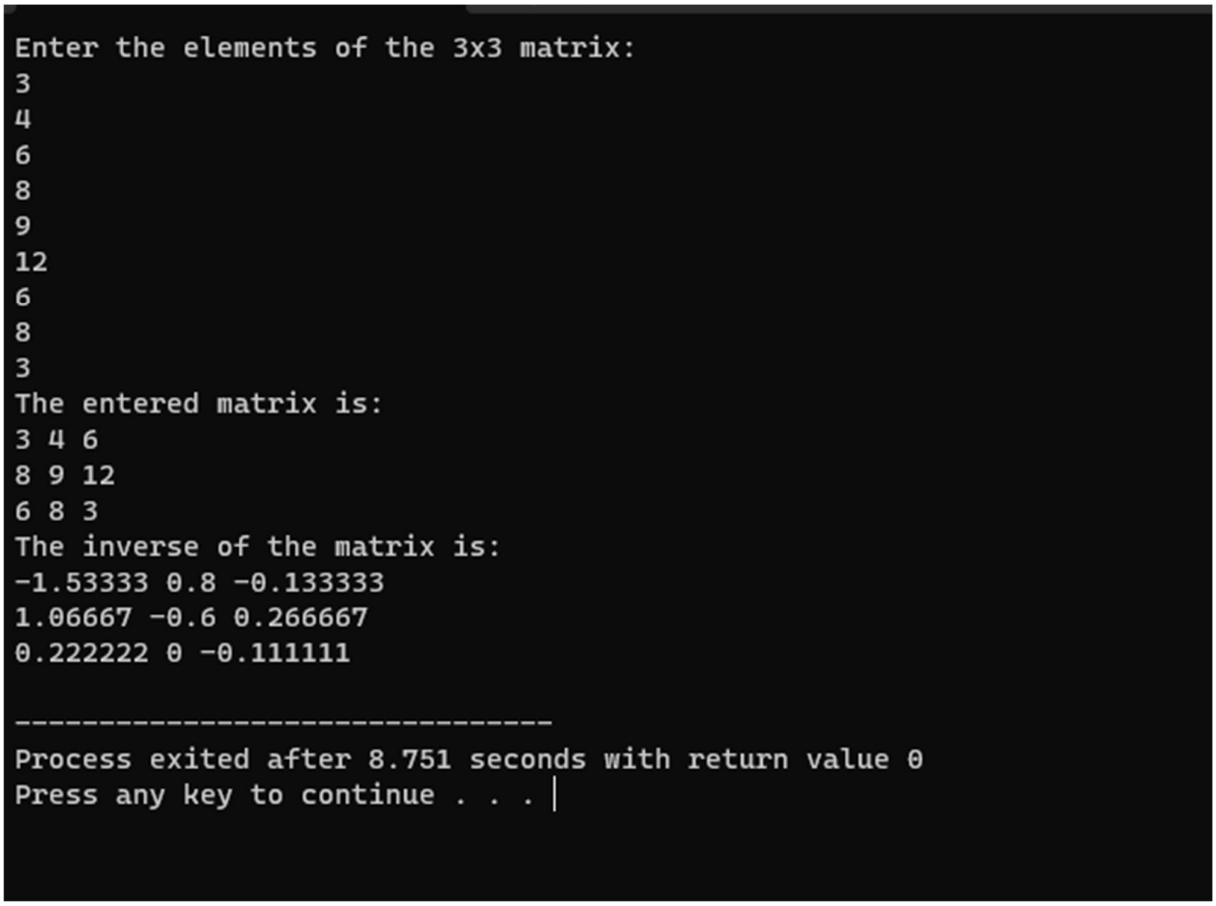
```
int main() {
   multiplication(15);

   return 0;
}
```

```
15 x 1 = 15
15 x 2 = 30
15 x 3 = 45
15 x 4 = 60
15 x 5 = 75
15 x 6 = 90
15 x 7 = 105
15 x 8 = 120
15 x 9 = 135
15 x 10 = 150

--------------------------------
Process exited after 0.04582 seconds with return value 0
Press any key to continue . . .
```

HOME TASK 1

```
#include <iostream>
using namespace std;

int main() {
   float matrix[3][3];

   cout << "Enter the elements of the 3x3 matrix:" << endl;
   for (int i = 0; i < 3; ++i)
      for (int j = 0; j < 3; ++j)
         cin >> matrix[i][j];

   cout << "The entered matrix is:" << endl;
   for (int i = 0; i < 3; ++i) {
      for (int j = 0; j < 3; ++j)
         cout << matrix[i][j] << " ";
```

```
        cout << endl;
    }

    float det = matrix[0][0] * (matrix[1][1] * matrix[2][2] - matrix[2][1] * matrix[1][2]) -
                matrix[0][1] * (matrix[1][0] * matrix[2][2] - matrix[2][0] * matrix[1][2]) +
                matrix[0][2] * (matrix[1][0] * matrix[2][1] - matrix[2][0] * matrix[1][1]);

    if (det == 0) {
        cout << "The matrix is singular and cannot be inverted." << endl;
    }
else{

    float adj[3][3];
    for (int i = 0; i < 3; ++i)
        for (int j = 0; j < 3; ++j)
            adj[i][j] = (matrix[(j + 1) % 3][(i + 1) % 3] * matrix[(j + 2) % 3][(i + 2) % 3] -
                         matrix[(j + 1) % 3][(i + 2) % 3] * matrix[(j + 2) % 3][(i + 1) % 3]);

    float inv[3][3];
    for (int i = 0; i < 3; ++i)
        for (int j = 0; j < 3; ++j)
            inv[i][j] = adj[i][j] / det;

    cout << "The inverse of the matrix is:" << endl;
    for (int i = 0; i < 3; ++i) {
        for (int j = 0; j < 3; ++j)
            cout << inv[i][j] << " ";
        cout << endl;
    }
}
    return 0;
}
```


Enter the elements of the 3x3 matrix:
3
4
6
8
9
12
6
8
3
The entered matrix is:
3 4 6
8 9 12
6 8 3
The inverse of the matrix is:
-1.53333 0.8 -0.133333
1.06667 -0.6 0.266667
0.222222 0 -0.111111

Process exited after 8.751 seconds with return value 0
Press any key to continue . . .