Fundamentals of Programming

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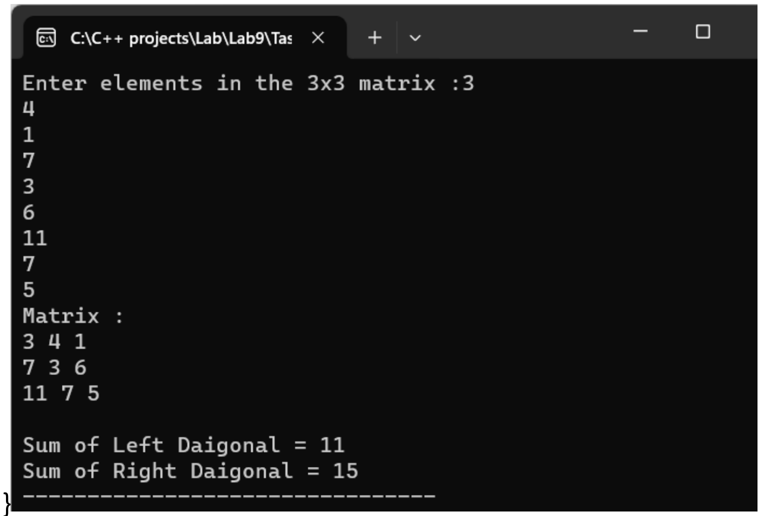
LAB TASK8

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

```
#include<iostream>

using namespace std;

int main()

{

        int a[3][3];

        cout<<"Enter elements in the 3x3 matrix :";

        for(int i=0; i<3; i++){         //loop to take input.

                for(int j=0; j<3; j++){

                        cin>>a[i][j];

                }

        }

        cout<<"Matrix :"<<endl;

        for(int i=0; i<3; i++){         //loop to show matrix.

                for(int j=0; j<3; j++){

                        cout<<a[i][j]<<" ";

                }

                cout<<endl;

        }

        cout<<endl;
```

```
int lsum=0, rsum=0;

for(int i=0; i<3; i++){            //loop to sum left diagonal.

            for(int j=i; j<=i; j++){

                        lsum = lsum + a[i][j];

            }

}

cout<<"Sum of Left Daigonal = "<<lsum<<endl;

int l=0, m=0;

for(int i=0; i<3; i++){          //loop to sum right daigonal.

            m=2;

            l=m-i;

            rsum = rsum + a[i][l];

}

cout<<"Sum of Right Daigonal = "<<rsum;


return 0;
```



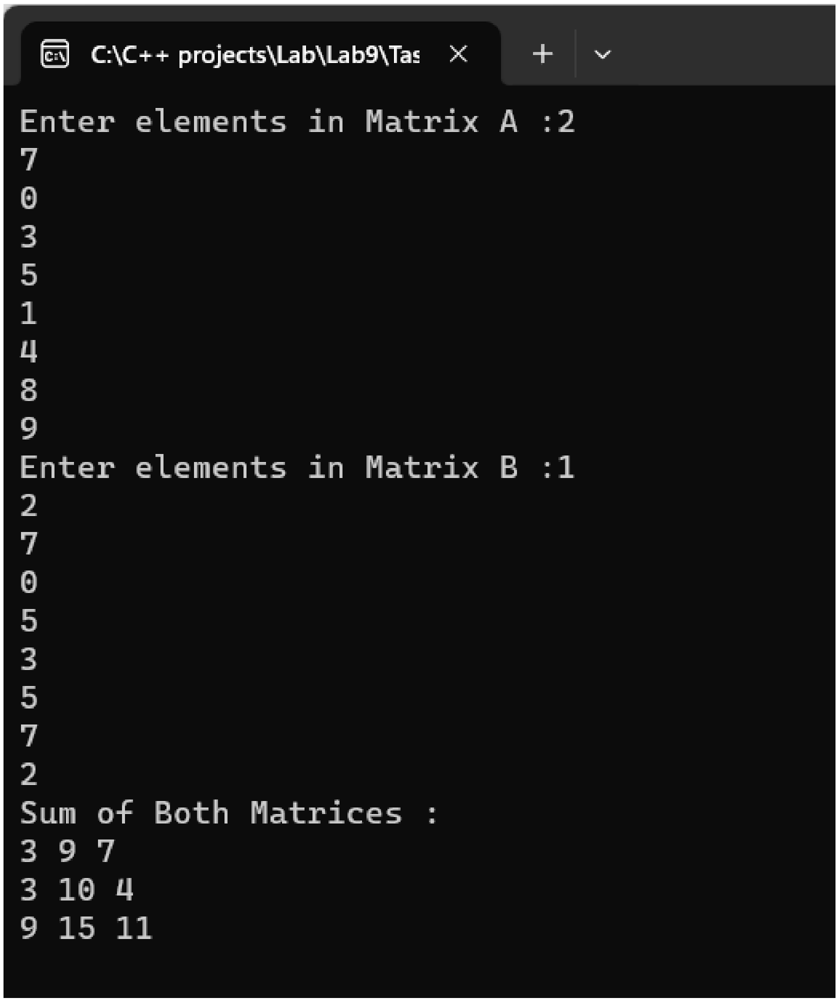
```
Enter elements in the 3x3 matrix :3
4
1
7
3
6
11
7
5
Matrix :
3 4 1
7 3 6
11 7 5

Sum of Left Daigonal = 11
Sum of Right Daigonal = 15
--------------------------------
```

```
}
```

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

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

void sum(int x[3][3], int y[3][3], int z[3][3]){
        for(int i=0; i<3; i++){
                for(int j=0; j<3; j++){
                        z[i][j] = x[i][j]+y[i][j];
                }
        }
}

int main()
{
        int a[3][3], b[3][3];
        cout<<"Enter elements in Matrix A :";
        for(int i=0; i<3; i++){         //loop to take input.
                for(int j=0; j<3; j++){
                        cin>>a[i][j];
                }
        }
        cout<<"Enter elements in Matrix B :";
        for(int i=0; i<3; i++){         //loop to take input.
                for(int j=0; j<3; j++){
                        cin>>b[i][j];
                }
        }
        int c[3][3];
        sum(a, b, c);
```

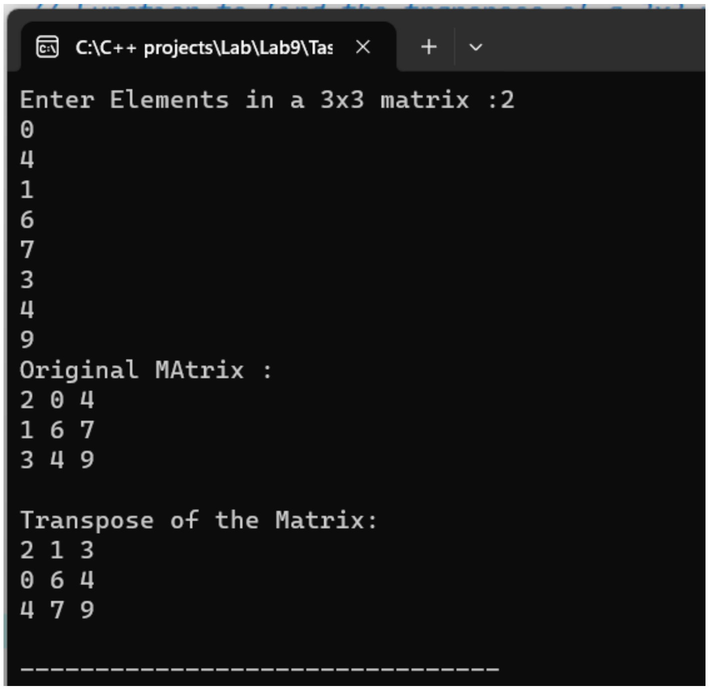
```
    for(int i=0; i<3; i++){          //loop to output.
        for(int j=0; j<3; j++){
            cout<<c[i][j]<<" ";
        }
        cout<<endl;
  }

    return 0;
}
```



```
Enter elements in Matrix A :2
7
0
3
5
1
4
8
9
Enter elements in Matrix B :1
2
7
0
5
3
5
7
2
Sum of Both Matrices :
3 9 7
3 10 4
9 15 11
```

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

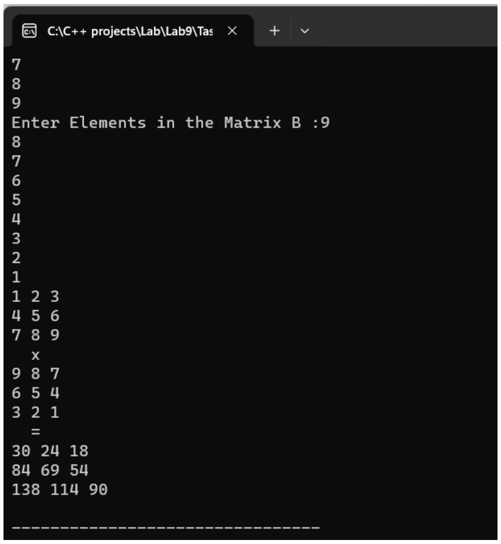
```
#include <iostream>

using namespace std;

void transposeMatrix(int matrix[3][3]) {        // Function to find the transpose of a 3x3 matrix

    int temp;

    for (int i = 0; i < 3; ++i) {

        for (int j = i + 1; j < 3; ++j) {

            temp = matrix[i][j];                         // Swap elements at [i][j] and [j][i]

            matrix[i][j] = matrix[j][i];

            matrix[j][i] = temp;

        }

    }

}


int main() {

                  int matrix[3][3];

    cout<<"Enter Elements in a 3x3 matrix :";

    for (int i = 0; i < 3; ++i) {

        for (int j = 0; j < 3; ++j) {

            cin >> matrix[i][j] ;

        }

    }

     cout<<"Original Matrix :"<<endl;

     for (int i = 0; i < 3; ++i) {

        for (int j = 0; j < 3; ++j) {

            cout<< matrix[i][j]<<" " ;

        }

        cout<<endl;

    }
    cout<<endl;

    transposeMatrix(matrix);                          // Call the transpose function

    cout<<"Transpose of the Matrix:"<<endl;          // Display transposed matrix

    for (int i = 0; i < 3; ++i) {

      for (int j = 0; j < 3; ++j) {

        cout<< matrix[i][j] << " ";

      }

      cout << endl;

    }


    return 0;

}
```



```
Enter Elements in a 3x3 matrix :2
0
4
1
6
7
3
4
9
Original MAtrix :
2 0 4
1 6 7
3 4 9

Transpose of the Matrix:
2 1 3
0 6 4
4 7 9

--------------------------------
```

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

```
#include<iostream>

using namespace std;


void Product(int x[3][3], int y[3][3], int z[3][3] ){

       for( int i=0; i<3; i++){

              for( int j=0; j<3; j++){

                     z[i][j] = 0;

                     for( int k=0; k<3  ; k++){

                            z[i][j] += x[i][k] * y[k][j];

                     }

              }

       }

}


int main()

{

       int a[3][3] , b[3][3] , c[3][3] ;

       cout<<"Enter Elements in the Matrix A :";

       for (int i = 0; i < 3; ++i) {

    for (int j = 0; j < 3; ++j) {

      cin >> a[i][j] ;

    }

  }


  cout<<"Enter Elements in the Matrix B :";

       for (int i = 0; i < 3; ++i) {

    for (int j = 0; j < 3; ++j) {

      cin >> b[i][j] ;

    }
  }
  Product(a, b, c);
  for(int i=0; i<3; i++){
       for( int j=0; j<3; j++){
              cout<<a[i][j]<<" ";
              }
              cout<<endl;
       }
  cout<<"  x    "<<endl;
  for(int i=0; i<3; i++){
       for( int j=0; j<3; j++){
              cout<<b[i][j]<<" ";
              }
              cout<<endl;
       }
  cout<<"  =   "<<endl;

//    cout<<"Resultant Matrix :";
  for(int i=0; i<3; i++){
       for( int j=0; j<3; j++){
              cout<<c[i][j]<<" ";
              }
              cout<<endl;
       }
       return 0;
}
```

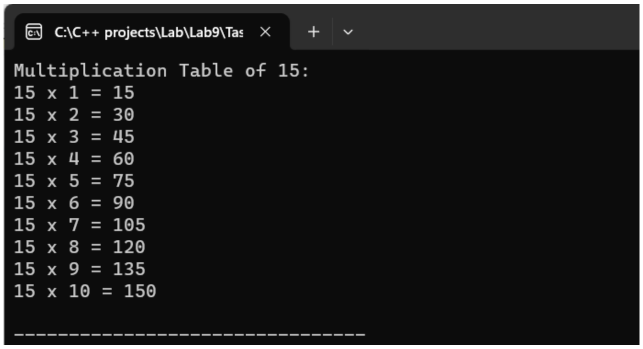


```
7
8
9
Enter Elements in the Matrix B :9
8
7
6
5
4
3
2
1
1 2 3
4 5 6
7 8 9
  x
9 8 7
6 5 4
3 2 1
  =
30 24 18
84 69 54
138 114 90

--------------------------------
```

5. Print the multiplication table of 15 using recursion.

```
#include <iostream>

using namespace std;


void Table(int N, int X) {

   if (X> 10) {          // Print up to 10 multiples

      return;

   }


   cout<<N <<" x "<<X<<" = "<<N * X<<endl;


   // Recursively call the function to print the next multiple

   Table(N, X + 1);

}
```

```
int main() {
   int tableOf = 15;

   cout << "Multiplication Table of " << tableOf << ":" << std::endl;
   Table(tableOf, 1); // Start from 1st multiple

   return 0;
}
```



```
Multiplication Table of 15:
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

--------------------------------
```