

Lab Manual #09

“Lab Tasks”



Course: **Fundamentals of Programming (CS 114)**

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Task 1:

Input:

```
vscode > G LabTask9-1.cpp
1  #include <iostream>
2  using namespace std;
3
4  v int main()
5  {
6      const int Size=3;
7      int matrix[Size][Size];
8      int sum_left=0,sum_right=0;
9
10     cout<<"enter elements of matrix: ";
11
12     v for (int i=0;i<Size;i++)
13     {
14         v for (int j=0;j<Size;j++)
15         {
16             cin>>matrix[i][j];
17             if (i==j)
18                 sum_left += matrix[i][j];
19             if ((i+j)==Size-1)
20                 sum_right += matrix[i][j];
21         }
22     }
23
24     cout <<"left Diagonal Sum: "<<sum_left <<endl;
25     cout<<"right Diagonal Sum: "<<sum_right<<endl;
26
27     return 0;
28 }
29
```

Output:

```
.\LabTask9-1
enter elements of matrix: 4
8
6
2
9
3
7
1
5
left Diagonal Sum: 18
right Diagonal Sum: 22
PS C:\Users\muham\Downloads\Lab\.vscode>
```

Task2:

Input:

```
1 #include <iostream>
2 using namespace std;
3
4 const int matSize = 3;
5
6 void addMatrices(const int mat1[matSize][matSize],const int mat2[matSize][matSize],int result[matSize][matSize]) {
7     for (int i=0;i<matSize;i++) {
8         for (int j=0;j<matSize;j++) {
9             result[i][j]=mat1[i][j]+mat2[i][j];
10        }
11    }
12 }
13 void displayMatrix(const int arr[matSize][matSize]) {
14     for (int i=0;i<matSize;i++) {
15         for (int j=0;j<matSize;j++) {
16             cout<<arr[i][j] <<" ";
17         }
18         cout << endl;
19     }
20 }
21 int main() {
22     int matA[matSize][matSize],matB[matSize][matSize],resultMat[matSize][matSize];
23     cout <<"enter elements of matrix A: "<<endl;
24     for (int i=0;i<matSize;i++) {
25         for (int j=0;j<matSize;j++) {
26             cin>>matA[i][j];
27         }
28     }
29     cout <<"ednter elements of matrix B: " <<endl;
30     for (int i=0;i<matSize;i++) {
31         for (int j=0;j<matSize;j++) {
32             cin >>matB[i][j];
33         }
34     }
35     addMatrices(matA,matB,resultMat);
36     cout << "Resultant matrrix: "<<endl;
37     displayMatrix(resultMat);
38     return 0;
39 }
```

Output:

```
enter elements of matrix A:
6
4
7
8
12
18
6
3
4
ednter elements of matrix B:
1
11
5
8
72
34
196
4
1
Resultant matrrix:
7 15 12
16 84 52
202 7 5
```

Task3:

Input:

```
code / C++ LabTask9-2.cpp
1  #include <iostream>
2  using namespace std;
3
4  const int matsize=3;
5  void transposeMatrix(int original[matsize][matsize],int transposed[matsize][matsize])
6  {
7      for (int i=0;i<matsize;++i)
8          for (int j=0;j<matsize;++j)
9              transposed[i][j]=original[j][i];}
10 int main() {
11     int matrix[matsize][matsize];
12     int transposedMatrix[matsize][matsize];
13     cout <<"Input matrix:" <<endl;
14     for (int i=0;i<matsize;++i)
15         for (int j=0;j<matsize;++j)
16             cin >>matrix[i][j];
17     cout <<"Original Matrix:" <<endl;
18     for (int i=0;i<matsize; ++i)
19     {
20         for (int j=0;j<matsize;++j)
21             cout <<matrix[i][j]<< ' ';
22         cout <<endl;
23     }
24     transposeMatrix(matrix,transposedMatrix);
25     cout <<"Transposed Matrix:" <<endl;
26     for (int i=0;i<matsize;++i) {
27         for (int j=0;j<matsize;++j)
28             cout<<transposedMatrix[i][j]<< ' ';
29         cout << endl;
30     }
31     return 0;
32 }
```

Output:

```
.\LabTask9-2 }
Input matrix:
5
6
9
7
2
4
2
8
1
Original Matrix:
5 6 9
7 2 4
2 8 1
Transposed Matrix:
5 7 2
6 2 8
9 4 1
```

Task4:

Input:

```
vscode > @ LabTask9-4.cpp
1  #include <iostream>
2  using namespace std;
3
4  const int matsize=3;
5  void multiplyMatrices(int matA[matsize][matsize],int matB[matsize][matsize],int result[matsize][matsize]) {
6      for (int i=0;i<matsize;++i)
7          for (int j=0;j<matsize;++j)
8              for (int k=0;k<matsize;++k)
9                  result[i][j] +=matA[i][k]*matB[k][j];}
10 int main() {
11     int matrixA[matsize][matsize],matrixB[matsize][matsize],resultMatrix[matsize][matsize]={0};
12     cout <<"enter elements of first matrix:"<<endl;
13     for(int i=0;i<matsize;++i)
14         for(int j=0;j<matsize;++j)
15             cin>>matrixA[i][j];
16     cout <<"enter elements of second matrix:"<<endl;
17     for(int i=0;i<matsize;++i)
18         for(int j=0;j<matsize;++j)
19             cin>>matrixB[i][j];
20     multiplyMatrices(matrixA, matrixB, resultMatrix);
21
22     cout << "Resultant Matrix:" << endl;
23     for(int i=0;i<matsize;++i) {
24         for (int j=0;j<matsize;++j)
25             cout<<resultMatrix[i][j]<<" ";
26         cout<<endl;
27     }
28     return 0;
29 }
```

Output:

```
.\LabTask9-4 }
Enter elements of the first matrix:
3
6
7
9
5
1
11
3
4
Enter elements of the second matrix:
6
5
8
2
3
7
9
1
4
Resultant Matrix:
93 40 94
73 61 111
108 68 125
```

Task 5:

Input:

```
code > LabTask9-2.cpp
1  #include <iostream>
2  using namespace std;
3
4  void MultiplicationTable(int num,int i)
5  {
6      cout<< "\n";
7      cout<<num<<"X"<<i<<"="<<num*i;
8      if (i<10)
9          MultiplicationTable(num,i+1);
10 }
11 int main() {
12     int num=15;
13     int i=1;
14     cout<<"multiplication Table of "<<num<<" is:";
15     MultiplicationTable(num,i);
16     return 0;
17 }
18
19
```

Output:

```
.\LabTask9-2 }
multiplication Table of 15 is:
15X1=15
15X2=30
15X3=45
15X4=60
15X5=75
15X6=90
15X7=105
15X8=120
15X9=135
15X10=150
PS C:\Users\muham\Downloads\Lab\.vscode> cd "c:\U
```

“Home Task”

Task 1

Input

```
code > C:\LabTaskHomeTask.cpp
#include<iostream>
using namespace std;

int main()
{
    int mat[3][3],i,j;
    float determinant=0;

    cout <<"enter elements of the matrix :\n";
    for (i=0;i<3;i++)
        for (j=0;j<3;j++)
            cin >>mat[i][j];
    cout <<" matrix you entered:\n";
    for (i=0;i<3;i++)
    {
        for (j=0;j<3;j++)
            cout<<mat[i][j]<< "\t";
        cout<<"\n";
    }
    for (i=0;i<3;i++)
        determinant=determinant+(mat[0][i]*(mat[1][(i+1)%3]*mat[2][(i+2)%3]-mat[1][(i+2)%3]*mat[2][(i+1)%3]));
    cout <<"\ndeterminant of matrix: "<< determinant;
    if (determinant ==0)
    {
        cout <<"\ninverse doesn't exist as the determinant is 0 or matrix is singular";
    } else {
        cout <<"\nInverse of the matrix is: \n";
        for (i=0;i<3;i++) {
            for (j=0;j<3;j++)
                cout<<((mat[(j+1)%3][(i+1)%3]*mat[(j+2)%3][(i+2)%3])-(mat[(j+1)%3][(i+2)%3]*mat[(j+2)%3][(i+1)%3]))/determinant<< "\t";
            cout << "\n";
        }
    }
    return 0;
}
```

Output:

```
.\LabTaskHomeTask }
enter elements of the matrix :
7
3
8
1
6
9
4
2
5
matrix you entered:
7      3      8
1      6      9
4      2      5

determinant of matrix: 1
Inverse of the matrix is:
-6      -19     19
31      3      -55
-10     6      24
PS C:\Users\muham\Downloads\Lab\.vscode>
```