Lab Manual #09

"Lab Tasks"

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

Instructor: Muhammad Affan

Name	**Muhammad Abdullah**
ID	**460901**
Section	**C**

Task 1:

Input:

vscode > LabTask9-1.cpp

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

int main()
{
    const int Size=3;
    int matrix[Size][Size];
    int sum_left=0,sum_right=0;

    cout<<"enter elements of matrix: ";

    for (int i=0;i<Size;i++)
    {
        for (int j=0;j<Size;j++)
        {
            cin>>matrix[i][j];
            if (i==j)
                sum_left += matrix[i][j];
            if ((i+j)==Size-1)
                sum_right += matrix[i][j];
        }
    }

    cout <<"left Diagonal Sum: "<<sum_left <<endl;
    cout<<"right Diagonal Sum: "<<sum_right<<endl;

    return 0;
}

```

Output:

```
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:

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

const int matSize = 3;

void addMatrices(const int mat1[matSize][matSize],const int mat2[matSize][matSize],int result[matSize][matSize]) {
    for (int i=0;i<matSize;i++) {
        for (int j=0;j<matSize;j++) {
            result[i][j]=mat1[i][j]+mat2[i][j];
        }
    }
}
void displayMatrix(const int arr[matSize][matSize]) {
    for (int i=0;i<matSize;i++) {
        for (int j=0;j<matSize;j++) {
            cout<<arr[i][j] <<" ";
        }
        cout << endl;
    }
}
int main() {
    int matA[matSize][matSize],matB[matSize][matSize],resultMat[matSize][matSize];
    cout <<"enter elements of matrix A: "<<endl;
    for (int i=0;i<matSize;i++) {
        for (int j=0;j<matSize;j++) {
            cin>>matA[i][j];
        }
    }
    cout <<"ednter elements of matrix B: " <<endl;
    for (int i=0;i<matSize;i++) {
        for (int j=0;j<matSize;j++) {
            cin >>matB[i][j];
        }}
    addMatrices(matA,matB,resultMat);
    cout << "Resultant matrtix: "<<endl;
    displayMatrix(resultMat);
    return 0;
}
```

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 matrtix:
7 15 12
16 84 52
202 7 5
```

Task3:

Input:

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

const int matsize=3;
void transposeMatrix(int original[matsize][matsize],int transposed[matsize][matsize])
{
    for (int i=0;i<matsize;++i)
        for (int j=0;j<matsize;++j)
            transposed[i][j]=original[j][i];}
int main() {
    int matrix[matsize][matsize];
    int transposedMatrix[matsize][matsize];
    cout <<"Input matrix:" <<endl;
    for (int i=0;i<matsize;++i)
        for (int j=0;j<matsize;++j)
            cin >>matrix[i][j];
    cout <<"Original Matrix:" <<endl;
    for (int i=0;i<matsize; ++i)
    {
        for (int j=0;j<matsize;++j)
            cout <<matrix[i][j]<< ' ';
        cout <<endl;
    }
    transposeMatrix(matrix,transposedMatrix);
    cout <<"Transposed Matrix:" <<endl;
    for (int i=0;i<matsize;++i) {
        for (int j=0;j<matsize;++j)
            cout<<transposedMatrix[i][j]<< ' ';
        cout << endl;
    }
    return 0;
}
```

Output:

```
.\Lab Task9-2 }
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:

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

const int matsize=3;
void multiplyMatrices(int matA[matsize][matsize],int matB[matsize][matsize],int result[matsize][matsize]) {
    for (int i=0;i<matsize;++i)
        for (int j=0;j<matsize;++j)
            for (int k=0;k<matsize;++k)
                result[i][j] +=matA[i][k]*matB[k][j];}
int main() {
    int matrixA[matsize][matsize],matrixB[matsize][matsize],resultMatrix[matsize][matsize]={0};
    cout <<"enter elements of first matrix:"<<endl;
    for(int i=0;i<matsize;++i)
        for(int j=0;j<matsize;++j)
         cin>>matrixA[i][j];
    cout <<"enter elements of second matrix:"<<endl;
    for(int i=0;i<matsize;++i)
    for(int j=0;j<matsize;++j)
        cin>>matrixB[i][j];
    multiplyMatrices(matrixA, matrixB, resultMatrix);

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

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:

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

void MultiplicationTable(int num,int i)
{
    cout<< "\n";
    cout<<num<<"X"<<i<<"="<<num*i;
    if (i<10)
        MultiplicationTable(num,i+1);
}
int main() {
    int num=15;
    int i=1;
    cout<<"multiplication Table of "<<num<<" is:";
    MultiplicationTable(num,i);
    return 0;
}
```

Output:

```
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

```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+ i) % 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>
```