NUST

NATIONAL UNIVERSITY
OF SCIENCES & TECHNOLOGY

Programming lab manual 09

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Section	C

<u>Q.No. 1</u>

```
#include<iostream>
using namespace std;
int main()
{

        int i, j, s=0;
        int arr[3][3];
        cout<<"Enter array elements : "<<endl;
        for(i=0;i<3;i++)
        {

                for(j=0; j<3; j++)
                {
                cin>>arr[i][j];     }
        }
for(i=0; i<3;i++)
{
        for(j=0; j<3; j++)

        {
                if(i==j || i+j==2)
                {
                        s=s+arr[i][j];



                }

        }

}

cout<<"thevsum of left and right diagonal is equal to : "<<s<<endl;

return 0;


}
```

Q.No.2

```
#include<iostream>

using namespace std;

int main()

{

        int i,j,s=0;

   int arr[3][3];

   cout<<"Enter the elements of an array : "<<endl;

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

   {

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

        {

                cin>>arr[i][j];
        }

    }

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

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

s=s+arr[i][j];

        }
    }


cout<<"The sum of all elements of an array : "<<s<<endl;
return 0;
}
```

Q.No.3

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

```
int main()


{

int i,j,s ;

  int arr[3][3];

  cout<<"Enter the elements of an array : "<<endl;

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

  {

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

                                                            {

                                                                cout<<"Enter elements in Row  "
<<i+1<<" column  "<<j+1<<" : ";

                                                            cin>>arr[i][j];

                                                                }

                                                            }

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

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

                                                                {


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


                                                                }

cout<<endl;

                                                            }

}
```

Q.No.4

```
#include<iostream>

using namespace std;

int main()

{

                                                       int matrix_1[3][3]={{1,2,3},

                                                                 {4,5,6},

                                                                 {7,8,9}};

int matrix_2[3][3] = {{9,8,7},

            {6,5,4},

{3,2,1}};

int sum=0;

//matrix summation

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

for(int j=0; j<3; ++j){                                sum = matrix_1[i][j]+matrix_2[i]    }}

                                                                         //display the result

                                                           cout<<"Rsesultant matrix after sum is
equal : "<<endl;

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

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

                                                                  cout<<sum<< " ";}

                                                           cout<<endl;}

                                                       return 0;}
```

Q.No.5

```
#include<iostream>
using namespace std;
void printTable(int n, int i=1){
                                        if(i<=10){
                                             cout<< n <<" x "<< i << " = " << n * i
<<endl;
                                             printTable(n, i+1);}        }

int main()
{
                                        cout<<" The multiplication table of 15 is
equalis equal to : "<<endl;
                                        printTable(15);
                                        return 0;

}
```

Q.No.01 home task

```
#include <iostream>
#include <cmath>

using namespace std;
```

```
// Function to calculate the determinant of a 2x2 matrix
float determinant2x2(float a, float b, float c, float d) {
    return a * d - b * c;
}

// Function to calculate the determinant of a 3x3 matrix
float determinant3x3(float matrix[3][3]) {
    float det = 0;
    for (int i = 0; i < 3; ++i) {
        det += matrix[0][i] * determinant2x2(matrix[1][(i + 1) % 3], matrix[2][(i + 2) % 3],
                                             matrix[1][(i + 2) % 3], matrix[2][(i + 1) % 3]);
    }
    return det;
}

// Function to calculate the cofactor of a 3x3 matrix
void cofactor(float matrix[3][3], float cofactorMatrix[3][3]) {
    for (int i = 0; i < 3; ++i) {
        for (int j = 0; j < 3; ++j) {
            cofactorMatrix[i][j] = pow(-1, i + j) * determinant2x2(matrix[(i + 1) % 3][(j + 1) % 3],
                                                                    matrix[(i + 1) % 3][(j + 2) % 3],
                                                                    matrix[(i + 2) % 3][(j + 1) % 3],
                                                                    matrix[(i + 2) % 3][(j + 2) % 3]);
        }
    }
}

// Function to transpose a matrix
void transpose(float matrix[3][3], float transposeMatrix[3][3]) {
    for (int i = 0; i < 3; ++i) {
        for (int j = 0; j < 3; ++j) {
            transposeMatrix[i][j] = matrix[j][i];
        }
    }
}

// Function to find the inverse of a 3x3 matrix
void inverse(float matrix[3][3], float inverseMatrix[3][3]) {
    float det = determinant3x3(matrix);

    if (det == 0) {
        cout << "The matrix is singular and does not have an inverse." << endl;
        return;
    }

    float cofactorMatrix[3][3];
    cofactor(matrix, cofactorMatrix);

    float adjointMatrix[3][3];
    transpose(cofactorMatrix, adjointMatrix);


    for (int i = 0; i < 3; ++i) {
        for (int j = 0; j < 3; ++j) {
            inverseMatrix[i][j] = adjointMatrix[i][j] / det;
        }
    }
}

// Function to display a 3x3 matrix
void displayMatrix(float matrix[3][3]) {
    for (int i = 0; i < 3; ++i) {
        for (int j = 0; j < 3; ++j) {
            cout << matrix[i][j] << " ";
        }
        cout << endl;
    }
}

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];
        }
    }

    float inverseMatrix[3][3];
    inverse(matrix, inverseMatrix);

    cout << "Inverse Matrix:" << endl;
    displayMatrix(inverseMatrix);

    return 0;
}
```