

Fundamentals of programming

Lab Manual 9



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ME-15 Section A

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Home Task:

1. Write a C++ program to take inverse of a 3x3 matrix using its determinant and adjoint

```
#include <iostream>

#include <cmath>

using namespace std;

//function to calculate the determinant
float Determinant(float mat[3][3]) {

    return mat[0][0] * (mat[1][1] * mat[2][2] - mat[2][1] * mat[1][2]) -
           mat[0][1] * (mat[1][0] * mat[2][2] - mat[2][0] * mat[1][2]) +
           mat[0][2] * (mat[1][0] * mat[2][1] - mat[2][0] * mat[1][1]);

}

// making function to calculate adjoint
void Adjoint(float mat[3][3], float adj[3][3]) {

    adj[0][0] = mat[1][1] * mat[2][2] - mat[2][1] * mat[1][2];
    adj[0][1] = mat[0][2] * mat[2][1] - mat[2][2] * mat[0][1];
    adj[0][2] = mat[0][1] * mat[1][2] - mat[1][1] * mat[0][2];
    adj[1][0] = mat[1][2] * mat[2][0] - mat[2][2] * mat[1][0];
    adj[1][1] = mat[0][0] * mat[2][2] - mat[2][0] * mat[0][2];
    adj[1][2] = mat[0][2] * mat[1][0] - mat[1][2] * mat[0][0];
    adj[2][0] = mat[1][0] * mat[2][1] - mat[2][0] * mat[1][1];
    adj[2][1] = mat[0][1] * mat[2][0] - mat[2][1] * mat[0][0];
    adj[2][2] = mat[0][0] * mat[1][1] - mat[1][0] * mat[0][1];

}

// making function to calculate the inverse
void calculateInverse(float mat[3][3], float inv[3][3]) {

    float det = Determinant(mat);

    // Check if the determinant is non-zero
```

```

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

float adj[3][3];
Adjoint(mat, adj);
for (int i = 0; i < 3; ++i) {
    for (int j = 0; j < 3; ++j) {
        inv[i][j] = adj[i][j] / det;
    } }
}

int main() {
    // entering values in matrix
    float matrix[3][3];
    cout << "please enter value of matrix for whom you want to find inverse" << endl;
    for (int i=0; i < 3; ++i) {
        for (int j = 0; j < 3; ++j) {
            cin>>matrix[i][j]; } }
    // using earlier built functions to calculate inverse
    float inverse[3][3];
    calculateInverse(matrix, inverse);
    // Display the inverse matrix
    cout << "Inverse Matrix:" << endl;
    for (int x=0;x<3;x++){
        for (int y=0;y<3;y++){
            cout<<inverse[x][y]<<" ";
        }
        cout<<endl;
    } return 0;
}

```

}

please enter value of matrix for whom you want to find inverse

6

8

2

6

1

3

7

2

3

Inverse Matrix:

-0.1875 -1.25 1.375

0.1875 0.25 -0.375

0.3125 2.75 -2.625

Process exited after 14.02 seconds with return value 0

Press any key to continue . . .