**Lab Task 9**

**Fundamentals of Programming**

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#include <iostream>

using namespace std;

float determinant2x2(float a, float b, float c, float d) {

    return a \* d - b \* c;

}

float determinant3x3(float mat[3][3]) {

    return mat[0][0] \* determinant2x2(mat[1][1], mat[1][2], mat[2][1], mat[2][2]) -

           mat[0][1] \* determinant2x2(mat[1][0], mat[1][2], mat[2][0], mat[2][2]) +

           mat[0][2] \* determinant2x2(mat[1][0], mat[1][1], mat[2][0], mat[2][1]);

}

void inverse(float mat[3][3]) {

    float det = determinant3x3(mat);

    if (det == 0) {

        cout << "Inverse does not exist (Matrix is singular)." << endl;

        return;

    }

    float adj[3][3] = {

        {mat[1][1] \* mat[2][2] - mat[1][2] \* mat[2][1], -(mat[1][0] \* mat[2][2] - mat[1][2] \* mat[2][0]), mat[1][0] \* mat[2][1] - mat[1][1] \* mat[2][0]},

        {-(mat[0][1] \* mat[2][2] - mat[0][2] \* mat[2][1]), mat[0][0] \* mat[2][2] - mat[0][2] \* mat[2][0], -(mat[0][0] \* mat[2][1] - mat[0][1] \* mat[2][0])},

        {mat[0][1] \* mat[1][2] - mat[0][2] \* mat[1][1], -(mat[0][0] \* mat[1][2] - mat[0][2] \* mat[1][0]), mat[0][0] \* mat[1][1] - mat[0][1] \* mat[1][0]}

    };

    float inv[3][3];

    for (int i = 0; i < 3; ++i)

        for (int j = 0; j < 3; ++j)

            inv[i][j] = adj[i][j] / det;

    cout << "Inverse matrix:" << endl;

    for (int i = 0; i < 3; ++i) {

        for (int j = 0; j < 3; ++j)

            cout << inv[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];

    inverse(matrix);

    return 0;

}

