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CS-114 Fundamentals of Programming (2+1)

DE-41 EE Semester 1

Fall 2019

**Assignment No 3**

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| **Submitted by** | **Roll No** |
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**QUESTION:**

Write a program that calculate inverse of matrix of order 4 by 4(maximum):

**Code:**

#include<iostream>

#include<iomanip>

using namespace std;

float determinant(float[4][4], int);

void cofactor(float[4][4], float);

void inverse(float[4][4], float[4][4], float);

int main()

{

float matrix[4][4];

int k;

float d;

cout <<"Enter the order of the Matrix : ";

cin >> k;

cout << "Enter the elements of Matrix : " << endl;

for (int i = 0;i < k; i++)

{

for (int j = 0;j < k; j++)

{

cin >> matrix[i][j];

}

}

d = determinant(matrix, k);

cout << "Determinant is: " << d << endl << endl;

if (d == 0)

cout << "Inverse of Entered Matrix is not possible" << endl;

else

cofactor(matrix, k);

system("pause");

return 0;

}

//determinant of matrix

float determinant(float a[4][4], int k)

{

float s = 1, det = 0;

float b[4][4];

int m, n;

if (k == 1)

{

return (a[0][0]);

}

else

{

det = 0;

for (int c = 0; c < k; c++)

{

m = 0;

n = 0;

for (int i = 0;i < k; i++)

{

for (int j = 0;j < k; j++)

{

b[i][j] = 0;

if (i != 0 && j != c)

{

b[m][n] = a[i][j];

if (n < (k - 2))

n++;

else

{

n = 0;

m++;

}

}

}

}

//calculating determinant

det = det + s \* (a[0][c] \* determinant(b, k - 1));

s = -1 \* s;

}

}

return (det);

}

//cofactor of each element

void cofactor(float num[4][4], float f)

{

float b[4][4], fac[4][4];

int rows, cols;

for (int q = 0;q < f; q++)

{

for (int p = 0;p < f; p++)

{

rows = 0;

cols = 0;

for (int i = 0;i < f; i++)

{

for (int j = 0;j < f; j++)

{

if (i != q && j != p)

{

b[rows][cols] = num[i][j];

if (cols < (f - 2))

cols++;

else

{

cols = 0;

rows++;

}

}

}

}

//calculating cofactor

fac[q][p] = pow(-1, q + p) \* determinant(b, f - 1);

}

}

inverse(num, fac, f);

}

//inverse of matrix

void inverse(float num[4][4], float fac[4][4], float r)

{

float b[4][4], inverse[4][4];

float d;

for (int i = 0; i < r; i++)

{

for (int j = 0; j < r; j++)

{

b[i][j] = fac[j][i];

}

}

//calculating determinant

d = determinant(num, r);

for (int i = 0;i < r; i++)

{

for (int j = 0;j < r; j++)

{

inverse[i][j] = b[i][j] / d;

}

}

//print inverse

cout << "Inverse of the matrix is : " << endl;

for (int i = 0;i < r; i++)

{

cout << "| ";

for (int j = 0;j < r; j++)

{

cout << setw(15) << left << inverse[i][j];

}

cout <<" |"<< endl;

}

}

**Output**

