



LOG IN

REGISTER

[Forums](#) > [Homework Help](#) > [Engineering and Comp Sci...](#) >

Matrix inverse with LU decomposition in C++

Comp Sci · KWKWII · Oct 11, 2014

Oct 11, 2014

#1

KWKWII

Homework Statement

the problem is to find the inverse of a 3x3 matrix using LU Decomposition with C++ command, with the numbers designated. in my case, my numbers for the matrix are

'306
410
780'

Code:



```
1  #include <stdio.h>
2  #include <iostream>
3  #include <stdlib.h>
4  #include <math.h>
5  using namespace std;
6
7  int main(void)
8  {
9      int e, i, j, k, y;
10     float A[3][4] = {{3,0,6,1},{4,1,0,2},{7,8,0,3}};
11     float x[3][3], c, sum;
12     float L[3][4] = {{1,0,0,0},{0,1,0,0},{0,0,1,0}};
13     for(j=0; j<=2; j++)
14     {
15         for(i=0; i<=2; i++)
16         {
17             if(i>j)
18             {
```

```
18         c=A[i][j]/A[j][j];
19         L[i][j] = c;
20         for(k=0; k<=2; k++)
21         {
22             A[i][k]=A[i][k]-c*A[j][k];
23         }
24     }
25 }
26
27
28 for(y=0; y<=2; y++)
29 {
30     if(y==0)
31     {
32         L[0][3] = 1;
33         L[1][3] = 0;
34         L[2][3] = 0;
35     }
36     else if (y==1)
37     {
38         L[0][3] = 0;
39         L[1][3] = 1;
40         L[2][3] = 0;
41     }
42     else if (y==2)
43     {
44         L[0][3] = 0;
45         L[1][3] = 0;
46         L[2][3] = 1;
47     }
48     A[0][3]=L[0][3]/L[0][0];
49     for(i=1; i<=2; i++)
50     {
51         sum=0;
52         for(j=i-1; j>=0; j--)
53         {
54             sum=sum+L[i][j]*A[j][3];
55         }
56         A[i][3]=(L[i][3]-sum)/L[i][i];
57     }
58     x[2][y]=A[2][3]/A[2][2];
59     for(i=1; i>=0; i--)
60     {
```

```

61         sum=0;
62         for(j=i+1; j<=2; j++)
63         {
64             sum=sum+A[i][j]*x[j][y];
65         }
66         x[i][y]=(A[i][3] - sum)/A[i][i];
67     }
68 }
69 cout<<"Matriks X"<<endl;
70 for(int i=0;i<=2;i++)
71 {
72     for(int j=0;j<=2;j++)
73     {
74         cout<< x[i][j]<<" ";
75     }
76     cout<<endl;
77 }
78 return(0);
79 }

```

□□
□□

Homework Equations

The Attempt at a Solution

the result from the program will show most numbers correct, except the numbers on X_{11} and X_{21}

it's supposed to be

$$A_{11} = A_{21} = 0$$

but it became

$$A_{11} = -3.97364e-08$$

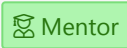
$$A_{21} = 1.19209e-07$$

with loop, i can find out the numbers from each matrix, and all of them are correct

only the calculations from the X matrix seems wrong
need help in making A_{11} and A_{21} become 0

Answers and Replies

Oct 11, 2014

[#2](#)**Mark44**

Is this the same as the one you posted yesterday? If so, do not repost a problem just because no one has yet responded.

KWKWII said: [↑](#)

Homework Statement

the problem is to find the inverse of a 3x3 matrix using LU Decomposition with C++ command, with the numbers designated. in my case, my numbers for the matrix are

'306

410

780'

Code:



```
1  #include <stdio.h>
2  #include <iostream>
3  #include <stdlib.h>
4  #include <math.h>
5  using namespace std;
6
7  int main(void)
8  {
9      int e, i, j, k, y;
10     float A[3][4] = {{3,0,6,1},{4,1,0,2},{7,8,0,3}};
11     float x[3][3], c, sum;
12     float L[3][4] = {{1,0,0,0},{0,1,0,0},{0,0,1,0}};
13         for(j=0; j<=2; j++)
14         {
```

```
15         for(i=0; i<=2; i++)
16         {
17             if(i>j)
18             {
19                 c=A[i][j]/A[j][j];
20                 L[i][j] = c;
21                 for(k=0; k<=2; k++)
22                 {
23                     A[i][k]=A[i][k]-c*A[j][k];
24                 }
25             }
26         }
27     }
28
29     for(y=0; y<=2; y++)
30     {
31         if(y==0)
32         {
33             L[0][3] = 1;
34             L[1][3] = 0;
35             L[2][3] = 0;
36         }
37         else if (y==1)
38         {
39             L[0][3] = 0;
40             L[1][3] = 1;
41             L[2][3] = 0;
42         }
43         else if (y==2)
44         {
45             L[0][3] = 0;
46             L[1][3] = 0;
47             L[2][3] = 1;
48         }
49         A[0][3]=L[0][3]/L[0][0];
50         for(i=1; i<=2; i++)
51         {
52             sum=0;
53             for(j=i-1; j>=0; j--)
54             {
55                 sum=sum+L[i][j]*A[j][3];
56             }
57             A[i][3]=(L[i][3]-sum)/L[i][i];
```

```

58         }
59         x[2][y]=A[2][3]/A[2][2];
60         for(i=1; i>=0; i--)
61         {
62             sum=0;
63             for(j=i+1; j<=2; j++)
64             {
65                 sum=sum+A[i][j]*x[j][y];
66             }
67             x[i][y]=(A[i][3] - sum)/A[i][i];
68         }
69     }
70     cout<<"Matriks X"<<endl;
71     for(int i=0;i<=2;i++)
72     {
73         for(int j=0;j<=2;j++)
74         {
75             cout<< x[i][j]<<" ";
76         }
77     cout<<endl;
78 }
79 return(0);

```



Homework Equations

The Attempt at a Solution

the result from the program will show most numbers correct, except the numbers on X_{11} and X_{21}

it's supposed to be

$$A_{11} = A_{21} = 0$$

but it became

$$A_{11} = -3.97364e-08$$

$$A_{21} = 1.19209e-07$$

with loop, i can find out the numbers from each matrix, and all of them are correct

only the calculations from the X matrix seems wrong

need help in making A_{11} and A_{21} become 0

All of your matrix variables are type float, which can hold only about 6 or 7 decimal places. You will have a lot more precision if you make them double.

[↩ Reply](#)

Oct 11, 2014

[🔗](#) #3

KWKWII 

Mark44 said: [↑](#)

do not repost a problem just because no one has yet responded

it is a repost, but i think i need to because when i re-read the guidelines, i must use proper English

which, i think, is not proper on my last post

so i tried to simplify my words on the new post (here)

and by using double for all matrix variables, it indeed became more precise, but also became worse

after changing float -> double

$$A_{11} = 7.40149e-17$$

$$A_{21} = -2.22045e-16$$

[↩ Reply](#)

Oct 11, 2014

[🔗](#) #4

Mark44

 Mentor



KWKWII said: [↑](#)

it is a repost, but i think i need to because when i re-read the guidelines, i must use proper English which, i think, is not proper on my last post

so i tried to simplify my words on the new post (here)

Your English was fine in the other post. If you need to edit a post, and you're no longer able to do it, report the post using the Report button, and a mentor will take care of it.

KWKWII said:

and by using double for all matrix variables, it indeed became more precise, but also became worse after changing float -> double

$$A_{11} = 7.40149e-17$$

$$A_{21} = -2.22045e-16$$

Those aren't worse. They're much closer to 0 than the results when you used float variables.

Floating point arithmetic on computers is inherently imprecise due to roundoff and truncation errors.

[↩ Reply](#)

Oct 11, 2014

[🔗](#) #5

KWKWII 

Mark44 said: [↑](#)

If you need to edit a post, and you're no longer able to do it, report the post using the Report button, and a mentor will take care of it

oh, i thought it wasn't fine...

i see, i'll do so next time

and also

although it is closer to 0, it is not 0

and the actual answer (done manually) is supposed to be 0

tried changing into integer, but it's even worse than using float or double

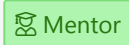
because the solution become numbers without decimals

is it also because of the rounding and truncation errors?

and i also notice that there's a minus on A_{21} and no minus on A_{11}
a weird change considering the previous one is reversed

[↩ Reply](#)

Oct 11, 2014

[🔗](#) #6**Mark44**

You can set the precision of the numbers you display using the precision function in the iosbase class. Look at the example code on this page:

http://www.cplusplus.com/reference/ios/ios_base/precision/.

[↩ Reply](#)

Oct 11, 2014

[🔗](#) #7**KWKWII**

Mark44 said:

using the precision function

Code:



```
1  #include <iomanip>
2
3  cout<< setprecision(3) << fixed << x[i][j]<<"  ";
```

(kind of different, but it works the same
i set it to only spell out 3 digits behind .)

using that, the result now becomes

$$A_{11} = -0.000$$

$$A_{21} = 0.000$$

well, although it's still weird for 0 to have (-) signs
but at least better for it shows the (seemingly) same amount as the actual answer


thanks

[↩ Reply](#)

Oct 11, 2014

[🔗](#) #8

Mark44

 Mentor



The setprecision function is just truncating (or possibly rounding - I don't know) the fractional parts of numbers like 0.000000587 and -0.000342, and displaying only the first three decimal places.

[↩ Reply](#)

Write your reply...

[LaTeX Guide](#) | [BBcode Guide](#)

[↩](#) Post reply

Related Threads on Matrix inverse with LU decomposition in C++

[Lu Decomposition in C](#)

Last Post

Replies 1

[Comp Sci](#) [LU Decomposition in Java](#)

Last Post

Replies 6

Matlab debugging for LU decomposition

Last Post

Replies 1

Inverse of a matrix

Last Post

Replies 4

Comp Sci Matrix diagonalization in c++

Last Post

Replies 2

Matrix inversion with complex numbers? or faster way?

Last Post

Replies 13

Matrix in C program help

Last Post

Replies 4

Comp Sci Fortran77 program to find the inverse of a matrix

Last Post

Replies 1

C matrix multiplication

Last Post

Replies 7

What is the inverse of the 3x3 matrix mod 26

Last Post

Replies 3

[Forums](#) > [Homework Help](#) > [Engineering and Comp Sci...](#) >

» HOT THREADS

[How replace numeral in string 'abc1def' w/ an array element?](#)

[Finding out the input impedance in a negative feedback op-amp](#)

[AC Circuit Phasors](#)

[Electrical and Control Engineering: Transfer Function Reduction problem](#)

[Kirchoff's Law Problem about this Induction Generator circuit](#)

» RECENT INSIGHTS

[How to Setup a Raspberry Pi Cluster](#)

[An Introduction to Theorema Primum](#)

[Python's Sympy Module and the Cayley-Hamilton Theorem](#)

CONTACT

ABOUT

TERMS

PRIVACY

HELP

2022 © PHYSICS FORUMS, ALL RIGHTS RESERVED