% Gauss-seidel method

clear all

clc;

tic;

format long

x = 1;

y = 1;

z = 0;

n = 15;

fprintf('initial point = (%d,%d,%d)\n',x,y,z)

fprintf('iter x y z\n')

for i=1:n

x = (5-y-z)/3;

y = (3-x+z)/3;

z = (1+3\*x+y)/5;

% x = (5-y-z)/3;

% y = (-1-3\*x+5\*z);

% z = (-3+x+3\*y);

fprintf(' %2d %f %f %f\n',i,x,y,z)

end

toc;

% Gauss-elimination method

clear all

clc;

tic;

format long

a = [3 1 1 5;1 3 -1 3;3 1 -5 -1];

%row=m

%column=n

[m,n] = size(a);

for j=1:m-1

%Gauss-elimination

for i=j+1:m

a(i,:) = a(i,:)-a(j,:)\*(a(i,j)/a(j,j));

end

end

%back substitution

x=zeros(1,m);

for s=m:-1:1

c=0;

for k=2:m

c=c+a(s,k)\*x(k);

end

x(s)=(a(s,n)-c)/a(s,s);

end

disp('Gauss elimination method:');

a

x'

toc;

**1(a)**

**Gauss-seidel method:**

initial point = (1,1,0)

iter x y z

1 1.333333 0.555556 1.111111

2 1.111111 1.000000 1.066667

3 0.977778 1.029630 0.992593

4 0.992593 1.000000 0.995556

5 1.001481 0.998025 1.000494

6 1.000494 1.000000 1.000296

7 0.999901 1.000132 0.999967

8 0.999967 1.000000 0.999980

9 1.000007 0.999991 1.000002

10 1.000002 1.000000 1.000001

11 1.000000 1.000001 1.000000

12 1.000000 1.000000 1.000000

13 1.000000 1.000000 1.000000

14 1.000000 1.000000 1.000000

15 1.000000 1.000000 1.000000

Elapsed time is 0.002803 seconds.

**Gauss elimination method:**

a =

3.000000000 1.000000000 1.000000000 5.000000000

0 2.666666667 -1.333333333 1.333333334

0 0 -6.000000000 -6.000000000

ans =

1.000000000

1.000000000

1.000000000

Elapsed time is 0.010440 seconds.

**1(b)**

**Gauss-seidel method**

initial point = (1,1,0)

iter x y z

1 1.333333 -5.000000 -16.666667

2 8.888889 -111.000000 -327.111111

3 147.703704 -2079.666667 -6094.296296

4 2726.320988 -38651.444444 -113231.012346

5 50629.152263 -718043.518519 -2103504.403292

6 940517.640604 -13339075.938272 -39076713.174211

7 17471931.370828 -247799360.983539 -725926154.579790

8 324575173.521110 -4603356294.462278 -13485493712.865725

9 6029616670.776001 -85516318577.656616 -250519339065.193850

10 112011885882.616820 -1588632352974.819800 -4653885173044.841800

Elapsed time is 0.015596 seconds.

**Gauss elimination method:**

a =

3 1 1 5

0 0 -6 -6

NaN NaN Inf Inf

ans =

NaN

NaN

NaN

Elapsed time is 0.019400 seconds.