**PROJECT4 MATLAB SESSION**

**gausselim.m**

clear

n=16;

for i=1:n

for j=1:n

a(i,j)=cos(1/(cos(i+j)+sin(j))); //or cos(cos(i+j)+sin(j)) for bad matrix

end

end

c=ones(n,1);

b=a\*c;

aorig=a;borig=b;

%Elimination

for i=1:n-1

for j=i+1:n

m=a(j,i)/a(i,i);

for k=i:n

a(j,k)=a(j,k)-m\*a(i,k);

end

b(j)=b(j)-m\*b(i);

end

end

%Back substitution

for i=n:-1:1

for j=i+1:n

b(i)=b(i)-a(i,j)\*x(j);

end

x(i)=b(i)/a(i,i);

end

x'

RFE=max(abs(x'-c))/max(abs(c))

RBE=max(abs(borig-aorig\*x'))/max(abs(borig))

EMF=RFE/RBE

ConditionNumber = cond(aorig,inf)

**GOOD N=8**

>> gausselim

ans =

0.999999999999996

0.999999999999998

0.999999999999996

1.000000000000004

0.999999999999998

1.000000000000004

1.000000000000003

1.000000000000003

RFE = 4.440892098500626e-15

RBE = 3.486710584460253e-16

EMF = 12.736623791756669

ConditionNumber = 72.241828926134218

**GOOD N=12**

>> gausselim

ans =

1.000000000000054

0.999999999999930

1.000000000000036

1.000000000000083

0.999999999999664

0.999999999999949

0.999999999999972

1.000000000000084

1.000000000000069

1.000000000000019

1.000000000000143

1.000000000000091

RFE = 3.360645095540349e-13

RBE = 1.118046192763224e-15

EMF = 3.005819542423910e+02

ConditionNumber = 3.269039517858745e+03

**GOOD N=16**

>> gausselim

ans =

1.000000000000026

1.000000000000046

0.999999999999925

0.999999999999997

1.000000000000134

1.000000000000119

0.999999999999980

0.999999999999900

0.999999999999955

0.999999999999997

0.999999999999994

0.999999999999831

0.999999999999989

0.999999999999997

1.000000000000067

1.000000000000029

RFE = 1.690869666504113e-13

RBE = 3.185518018837390e-15

EMF = 53.079896472261233

ConditionNumber = 1.200341835610846e+03

**BAD N=8**

>> gausselim

ans =

1.000000010081661

0.999999993125430

0.999999998165237

0.999999983894538

1.000000014970266

1.000000001807664

1.000000007490611

0.999999990464593

RFE = 1.610546207508889e-08

RBE = 1.115312642889253e-16

EMF = 1.444031158238033e+08

ConditionNumber = 1.692232749719856e+08

**BAD N=12**

>> gausselim

ans =

0.999993581769813

0.999992308604738

0.999995512036226

1.000013270410032

1.000017603238651

1.000011768974428

0.999988163816030

0.999982380217275

0.999986815217488

1.000004508001168

1.000007712544841

1.000006375169309

RFE = 1.761978272507569e-05

RBE = 2.975704592961443e-16

EMF = 5.921213673814430e+10

ConditionNumber = 2.020921567456898e+12

**BAD N=16**

>> gausselim

ans =

-17.248073866968237

15.318890270238935

-14.267357275183048

46.576967208884099

-31.944602826800597

34.717358664841889

-64.404443420716220

42.933336046525802

-40.330144008385027

66.246909587059037

-33.277988803479708

33.573634666248758

-44.256994985280883

16.531810609304831

-13.215486681698300

19.046184815408665

RFE = 65.404443420716220

RBE = 1.115500872302822e-15

EMF = 5.863235524477568e+16

Warning: Matrix is close to singular or badly scaled. Results may be inaccurate. RCOND =

4.084521e-17.

> In cond (line 46)

In gausselim (line 32)

ConditionNumber = 1.631482991227879e+17