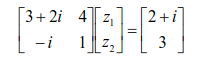
Numerical Methods Homework-5

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1. Solve the following system:



ANS :

1. Code\_function :

function [X]=Cramer(A,B)

row = size(A,1);

col = size(A,2);

if(row ~= col)

fprintf('row != col')

X = [];

return

end

X = [];

d\_A = det(A);

for j = 1:col

A\_temp = A;

for i = 1:row

A\_temp(i,j) = B(i,1);

end

x\_ = det(A\_temp)/d\_A;

X = [X;x\_];

end

end

1. Code\_main :

close all

clear all

format long

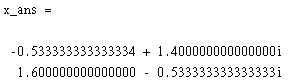
i = sqrt(-1)

A = [3+2i,4;-i,1]

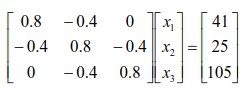
b = [2+i;3]

x\_ans = Cramer(A,b)

1. Result:



2. Solve the following tridiagonal system:



ANS :

1. Code\_function :

function [X]=Tridiagonal(e,f,g,r)

n = size(f,2)

X = []

for k = 2:n

factor = e(k)/f(k-1);

f(k) = f(k) - factor\*g(k-1);

r(k) = r(k) - factor\*r(k-1);

end

X(n) = r(n)/f(n);

for k = n-1:-1:1

X(k) = (r(k)-g(k)\*X(k+1))/f(k)

end

end

1. Code\_main :

close all

clear all

format long

i = sqrt(-1)

e = [0,-0.4,-0.4]

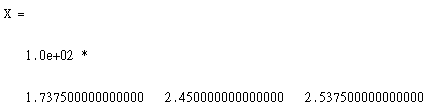
f = [0.8,0.8,0.8]

g = [-0.4,-0.4,0]

b = [41,25,105]

[X]=Tridiagonal(e,f,g,b)

1. Result:



3. (a)Determine the LU factorization without pivoting by hand for the following matrix and check your results by validating that [L][U]=[A].



ANS :

(b). Employ the result of (a) to compute the determinant.

ANS:

(c). To verify your answer, repeat (a) and (b) using MATLAB.

ANS:

1. Code\_main:

close all

clear all

format long

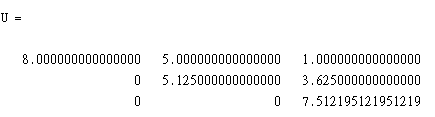
A = [8,5,1;

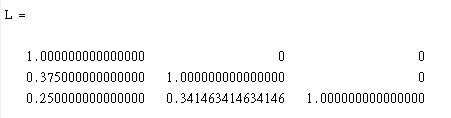
3,7,4;

2,3,9]

[L,U] = lu(A)

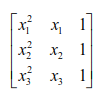
det\_A = det(L)\*det(U)

1. Result:





4. One of the ill-conditioned matrices is the Vandermonde matrix, which has the   
 following form:



(a). Determine the condition number based on the row-sum norm for the case where

x1 = 4 , x2 = 2 , and x3 = 7 .

ANS:

1. Code\_main:

close all

clear all

format long

A = [4^2,4,1;

2^2,2,1;

7^2,7,1]

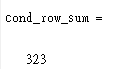
inv\_A = inv(A)

row\_sum\_A = norm(A,inf)

row\_sum\_inv\_A = norm(inv\_A,inf)

cond\_row\_sum = row\_sum\_A\*row\_sum\_inv\_A

1. Result:



(b). Find the spectral and Frobenius condition numbers.

ANS:

1. Code\_main:

close all

clear all

format long

A = [4^2,4,1;

2^2,2,1;

7^2,7,1]

inv\_A = inv(A)

%spectral

sp\_A = norm(A,2)

sp\_inv\_A = norm(inv\_A,2)

cond\_spe = sp\_A\*sp\_inv\_A

cond\_2 = cond(A,2)

%Fro

Fro\_A = norm(A,'fro')

Fro\_inv\_A = norm(inv\_A,'fro')

cond\_Fro = Fro\_A\*Fro\_inv\_A

cond\_Fr = cond(A,'fro')

1. Result: