**NUMERICAL ANALYSIS**

**MATLAB ASSIGNMENT 5**

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**3. Solve this system of equations by Gauss-Seidel starting with the initial vector [0, 0, 0] and tolerance 10^−3:**

**4.63x1 − 1.21x2 + 3.22x3 = 2.22**

**−3.07x1 + 5.48x2 + 2.11x3 = −3.17**

**1.26x1 + 3.11x2 + 4.57x3 = 5.11.**

A=[4.63 -1.21 3.22; -3.07 5.48 2.11; 1.26 3.11 4.57];

b=[2.22; -3.17; 5.11];

x0=[0; 0; 0];

n=max(size(A));

w=1;

e=0.001;

k=1;

x=x0;

err=[0.1; 0.1; 0.1];

while norm(err, "inf")>=e

for i=1:n

sum1=0;

sum2=0;

for j=1:i-1

sum1=sum1+A(i,j)\*x(j);

end

for j=i+1:n

sum2=sum2+A(i,j)\*x0(j);

end

x(i)=((1-w)\*x0(i))+((w/A(i,i))\*(b(i)-sum1-sum2));

err(i)=abs(x(i)-x0(i));

k=k+1;

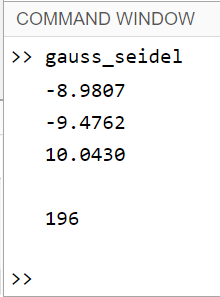
x0(i)=x(i);

end

end

disp(x);

disp(k);



**4. Use the SOR method with ω = 1.2 to solve the linear system with an initial vector [0, 0, 0, 0] a tolerance 10^−3 in the ||. ||∞ norm.**

**4x1 + x2 − x3 + x4 = −2**

**x1 + 4x2 − x3 − x4 = −1**

**−x1 − x2 + 5x3 + x4 = 0**

**x1 − x2 + x3 + 3x4 = 1.**

A=[4 1 -1 1; 1 4 -1 -1; -1 -1 5 1; 1 -1 1 3];

b=[-2; -1; 0; 1];

x0=[0; 0; 0; 0];

n=max(size(A));

w=input("Relaxation parameter: ");

e=0.001;

k=1;

x=x0;

err=[0.1; 0.1; 0.1; 0.1];

while norm(err, "inf")>=e

for i=1:n

sum1=0;

sum2=0;

for j=1:i-1

sum1=sum1+A(i,j)\*x(j);

end

for j=i+1:n

sum2=sum2+A(i,j)\*x0(j);

end

x(i)=((1-w)\*x0(i))+((w/A(i,i))\*(b(i)-sum1-sum2));

err(i)=abs(x(i)-x0(i));

k=k+1;

x0(i)=x(i);

end

end

disp(x);

disp(k);

