NA Experiment - 5

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2) Algorithm for SOR method-

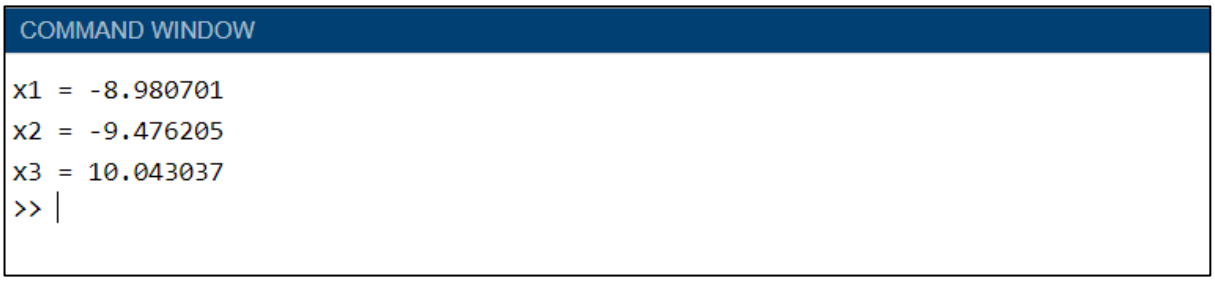
For given system of linear equations represented as

Ax=b

1. Input matrix A=[aij], b, xo, tolerance, omega(w) and initial error.
2. While (error>tolerance) perform steps from 3 to 9.
3. For(i=1,2,.....n) perform steps from 4 to 8.
4. xo(i)=x(i)
5. sum=0
6. for(j=1,2,....n) perform step 7.
7. if(i!=j), perform sum=sum+A(i,j)*x(j)
8. x(i)=(1-w)*xo(i)+(w*(b(i,:)-sum))/A(i,i)
9. error=abs(x(i)-xo(i))
10. Output(x1,x2,.....xn)
11. Stop

3)

```
clc
clear
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];
tol = 0.001;
n=3;
error = 1;
x = zeros(1,n);
xold = zeros(1,n);
while error > tol
    for i=1:n
        xold(i) = x(i);
        sum =0;
        for j=1:n
            if(i~=j)
                sum = sum + A(i,j)*x(j);
            end
        end
        x(i) = (B(i,:) - sum)/A(i,i);
    end
    error = abs(x(i)-xold(i));
end
for i=1:n
    fprintf("x%d = %f\n",i,x(i));
end
```



4)

```
clc
clear
A=[4 1 -1 1;1 4 -1 -1;-1 -1 5 1;1 -1 1 3];
B=[-2;-1;0;1];
tol = 0.001;
w = 1.2;
n=4;
error = 1;
x = zeros(1,n);
xold = zeros(1,n);
while error > tol
    for i=1:n
        xold(i) = x(i);
        sum =0;
        for j=1:n
            if(i~=j)
                sum = sum + A(i,j)*x(j);
            end
        end
        x(i) = (1-w)*xold(i) + (w*(B(i,:) -
sum))/A(i,i);
    end
    error = abs(x(i)-xold(i));
end
for i=1:n
    fprintf("x%d = %f\n",i,x(i));
end
```

COMMAND WINDOW

```
x1 = -0.754049
x2 = 0.040378
x3 = -0.280775
x4 = 0.691846
>>
```