20-02-2021

# LAB ASSIGNMENT

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**18MIS7250**

## Problem:

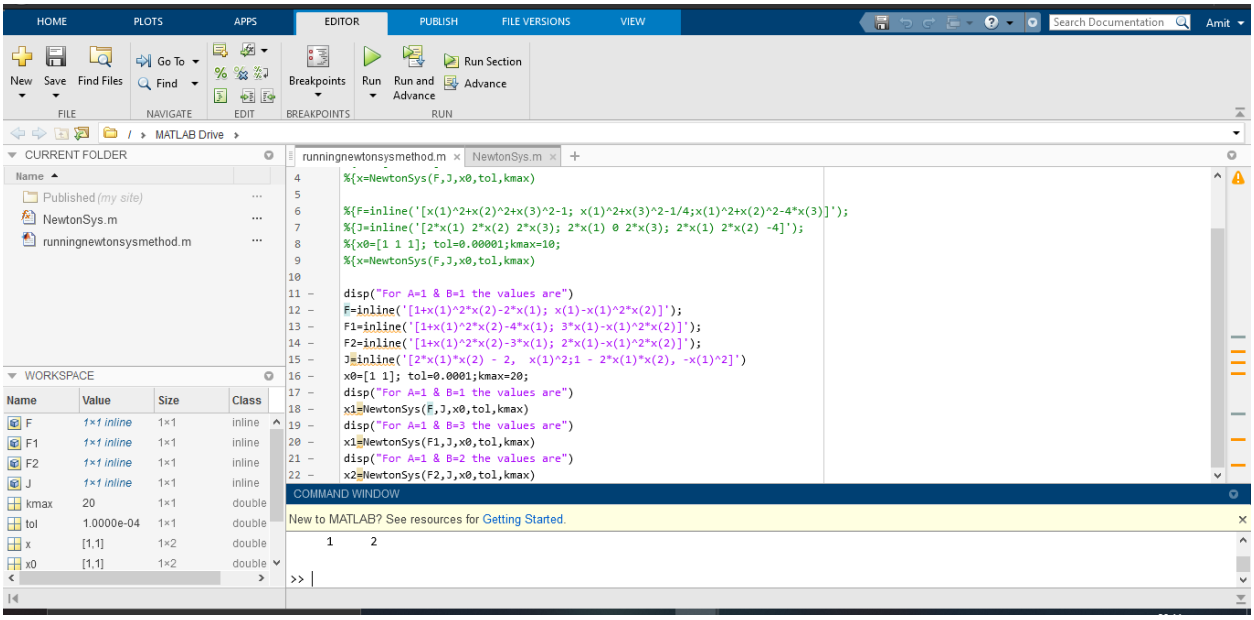
The steady state of the concentration of two chemical species in an oscillatory chemical system described by the Brusselator model is given by the non-linear system:

$$0 = A + x^2 y - (B+1)x$$

$$0 = Bx - x^2 y$$

Find the solution for the following values of the parameters, $A$ and $B$:

1) $A$ =1, $B$=1.
2) $A$ =1, $B$=3.
3) $A$ =1, $B$=2.



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```
disp("For A=1 & B=1 the values are")
F=inline('[1+x(1)^2*x(2)-2*x(1); x(1)-x(1)^2*x(2)]');
F1=inline('[1+x(1)^2*x(2)-4*x(1); 3*x(1)-x(1)^2*x(2)]');
F2=inline('[1+x(1)^2*x(2)-3*x(1); 2*x(1)-x(1)^2*x(2)]');
J=inline('[2*x(1)*x(2) - 2,  x(1)^2;1 - 2*x(1)*x(2), -x(1)^2]')
x0=[1 1]; tol=0.0001;kmax=20;
disp("For A=1 & B=1 the values are")
x=NewtonSys(F,J,x0,tol,kmax)
disp("For A=1 & B=3 the values are")
x1=NewtonSys(F1,J,x0,tol,kmax)
disp("For A=1 & B=2 the values are")
x2=NewtonSys(F2,J,x0,tol,kmax)
```

```
runningnewtonsysmethod
For A=1 & B=1 the values are

J =

     Inline function:
     J(x) = [2*x(1)*x(2) - 2,  x(1)^2;1 - 2*x(1)*x(2), -x(1)^2]

For A=1 & B=1 the values are
     1     1     1     0

Newton method has converged

x =

     1     1

For A=1 & B=3 the values are
     1     1     3     2


iter =

     2

     2     1     3     0

Newton method has converged
```

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```
x1 =

     1     3

For A=1 & B=2 the values are
     1     1     2     1


iter =

     2

     2     1     2     0

Newton method has converged

x2 =

     1     2
```