LAB ASSIGNMENT 4

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Slot: L11+L12

Ques 1. Find the general solution of the homogeneous system

$dx/dt = 3x - 4y,$

$dy/dt = 4x - 7y.$

```
1 -    clc
2 -    clear
3 -    A=input('Enter A:');
4 -    [P D]=eig(A);
5 -    Sol1 = dsolve(['D2y = ',num2str(D(1)),'*y']);
6 -    Sol2 = dsolve(['D2y = ',num2str(D(4)),'*y']);
7 -    X = P*[Sol1;Sol2];
8 -    disp('x1=');
9 -    disp(X(1))
10 -   disp('x2=');
11 -   disp(X(2))
```

Command Window

New to MATLAB? See resources for Getting Started.

```
Enter A:[3 -4;4 -7]
x1=
(2*5^(1/2)*(C4*exp(t) + C3*exp(-t)))/5 + (5^(1/2)*(C6*cos(5^(1/2)*t) + C7*sin(5^(1/2)*t)))/5

x2=
(5^(1/2)*(C4*exp(t) + C3*exp(-t)))/5 + (2*5^(1/2)*(C6*cos(5^(1/2)*t) + C7*sin(5^(1/2)*t)))/5

fx >>
```

Ques 2. Find the power series solution in

powers of x, (a) $y'' - y' + xy = 0,$

```
clc
clear
syms x a0 a1 a2 a3
a = [a0 a1 a2 a3];
y = sum(a.*(x).^[0:3]);
dy = diff(y);
d2y = diff(dy);
gde = collect(d2y-dy+x*y,x);
cof=coeffs(gde,x);
A2=solve(cof(1),a2);
A3=solve(cof(2),a3);
y=subs(y,[a2,a3],[A2,A3]);
y=coeffs(y,[a1 a0]);
disp('Solution is')
disp(['y=A(',char(y(1)),'+ ...)+B(',char(y(2)),'+ ...)'])
```

Command Window

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```
Solution is
y=A((a2*x^3)/3+ ...)+B(1 - x^3/6+ ...)
fx >>
```

(a) (*b*) $y'' - y' + x2y = 0$.

```
clc
clear
syms x a0 a1 a2 a3
a = [a0 a1 a2 a3];
y = sum(a.*(x).^[0:3]);
dy = diff(y);
d2y = diff(dy);
gde = collect(d2y-dy+x*x*y,x);
cof=coeffs(gde,x);
A2=solve(cof(1),a2);
A3=solve(cof(2),a3);
y=subs(y,[a2,a3],[A2,A3]);
y=coeffs(y,[a1 a0]);
disp('Solution is')
disp(['y=A(',char(y(1)),'+ ...)+B(',char(y(2)),'+ ...)'])
```

Command Window

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```
Solution is
y=A((a2*x^3)/3+ ...)+B(1+ ...)
fx >>
```