## ETEC 301 Lab 3

## Solving linear differential equations

## Name Joshua Valerio Section 62

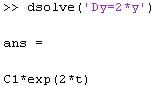
## Complete, verify (where indicated) and submit the MATLAB output of all the following examples:9

1. **First order equations without initial conditions**

Solve:

Use: dsolve('Dy=2\*y') **[Verify manually]**

**Answer = C1\*exp(2\*t)**



1. **First order equations with initial** **conditions**

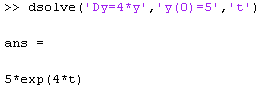
Add initial conditions by using the command:

dsolve('equation','initial condition','variable')

Solve:

Use: dsolve('Dy=4\*y','y(0)=5','t')

**Answer = 5\*exp(4\*t)**

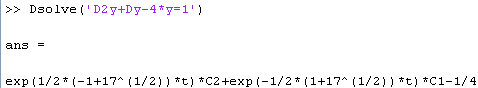


1. **Second order equations without initial conditions**

using the command: **dsolve**

**Dsolve(‘D2y+Dy-4\*y=1’)**

**Answer = exp(1/2\*(-1+17^(1/2))\*t)\*C2+exp(-1/2\*(1+17^(1/2))\*t)\*C1-1/4**

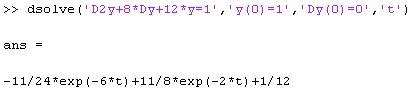


1. **Second order equations with initial conditions**

**4a.**

Use:

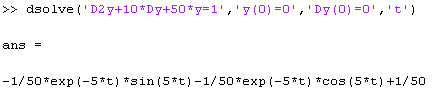
>> dsolve('D2y+8\*Dy+12\*y=1','y(0)=1','Dy(0)=0','t')

**Answer = -11/24\*exp(-6\*t)+11/8\*exp(-2\*t)+1/12**

**4b.**

Dsolve(‘D2y+10\*Dy+50\*y=1’,’y(0)=0’,’Dy(y)=0’,’t’)

**Answer = -1/50\*exp(-5\*t)\*sin(5\*t)-1/50\*exp(-5\*t)\*cos(5\*t)+1/50**



1. **Solving and plotting**

Suppose we want to solve and plot the solution to the second order equation

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Try:

>>eqn2 = ’D2y + 4\*Dy + 3\*y = cos(t)’;

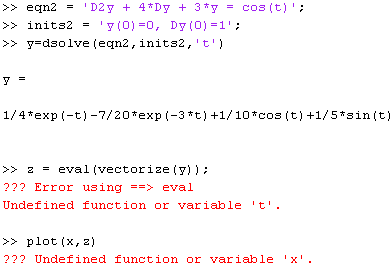
>>inits2 = ’y(0)=0, Dy(0)=1’;

>>y=dsolve(eqn2,inits2,’t’)

>>z = eval(vectorize(y));

>>plot(x,z)

**Answer: y = 1/4\*exp(-t)-7/20\*exp(-3\*t)+1/10\*cos(t)+1/5\*sin(t)**

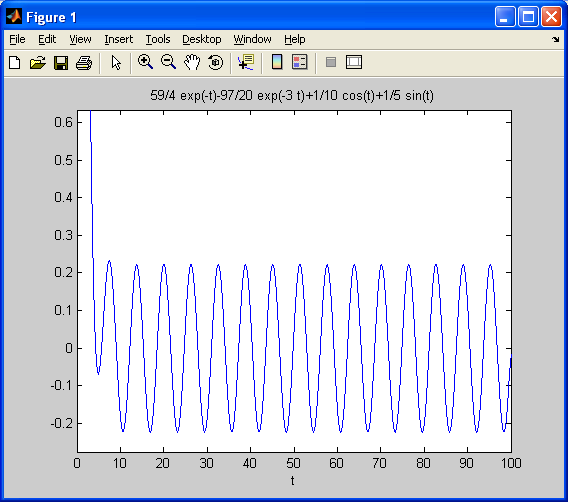


**5a. Using ezplot.**

Try also:

ezplot(dsolve(’D2y + 4\*Dy + 3\*y = cos(t)','y(0)=10','Dy(0)=0','t'),[0,100])

**Answer:**



1. Solve for y(t) and plot y(t) vs time for the following second-order DE:

**[Verify manually]**

eqn2 = ‘D2y + 7Dy + 12 y = exp(-2t)’

inits2= ‘y(0)=0, Dy(0)=1’

y=dsolve(eqn2,inits2,’t’)

**Answer:**