MATH 202
MATLAB EXERCISE I

Commands (I)

Basic Operations: Addition (+)Subtraction (-) Multiplication (*) Division (/)Exponent (^)

Example: $x^2 + \frac{2}{3}x - 16 \div 7^5 \times 2 = x\text{^}2 + 2/3*x - 16/7\text{^}5*2$

Solution of ODE: Command (dsolve)

$y' = Dy$, $y'' = D2y$, $y''' = D3y$, Independent variable x = 'x'

The following 3 examples show how to use MATLAB to solve ODE:

Example 1

Solve the Ist Order ODE: $y' + 2y = x$

MATLAB Command: >>dsolve('$Dy + 2*y = x$','x') **Press "Enter key"**

MATLAB Answer: $1/2*x - 1/4 + \exp(-2*x)*C1$

What does MATLAB Answer mean: $y = \frac{1}{2}x - \frac{1}{4} + Ce^{-2x}$

Example 2

Solve Ist Order IVP: $y' = ay \qquad y(0) = b$

MATLAB Command: >>dsolve('$Dy = a*y$','$y(0) = b$','x') **Press "Enter key"**

MATLAB Answer: $\exp(a*x)*b$

What does MATLAB Answer mean: $y = be^{ax}$

Example 3

Solve the 2nd Order IVP: $y'' = -a^2 y, \qquad y(0) = 1, \qquad y'\left(\frac{\pi}{a}\right) = 0$

MATLAB Command:

>>dsolve('$D2y = -a\text{^}2*y$','$y(0) = 1$','$Dy\left(\frac{\pi}{a}\right) = 0$', '$x$') **Press "Enter key"**

MATLAB Answer: $\cos(a*x)$

What does MATLAB Answer mean: $y = \cos(ax)$

Now do the same and **solve the following ODE**:

1. $xy' - y = x$, $y(1) = 4$

2. $y' + 6y = e^x$

3. $xy' - 2y = x^3 \cos x$