MATH 260
MATLAB EXERCISE I

Commands (I)

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

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

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:** $y = \dfrac{1}{2}x - \dfrac{1}{4} + Ce^{-2x}$

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: $y'' = -a^2 y$, $\qquad y(0) = 1$, $\qquad y'\left(\dfrac{\pi}{a}\right) = 0$

> **MATLAB Command:**
>
> >>dsolve$\left('D2y = -a\text{^}2 * y', 'y(0) = 1', 'Dy\left(\dfrac{\pi}{a}\right) = 0', 'x'\right)$ **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. $xy' - y = x$, $y(1) = 5$

2. $y' + 4y = e^x$

3. $xy' - 6y = x^3 \cos x$