

MATH 202 MATLAB EXERCISE I

Commands (I)

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

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

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 1st 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 1st Order IVP: $y' = ay$ $y(0) = b$

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

MATLAB Command:

`>>dsolve('D2y = -a^2 * y','y(0) = 1','Dy(\frac{\pi}{a}) = 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. $xy' - y = x$, $y(1) = 7$

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

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