

Help Sheet for MATLAB Assignment#1

- Assignment#1 is about solving 1st order ODEs and IVPs using Matlab. The assignment also includes plotting solution after solving the differential equation.
 - Before attempting the assignment go through this help sheet,
 - to understand how to use the command “dsolve”
 - to learn how to plot the output of “dsolve”
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Solving ODEs using Matlab

- Matlab command needed: `>> dsolve()`
Its usage is explained with the help of example below.
- Suppose we want to solve $\frac{dy}{dx} = xy$. Then we will use

```
>> y = dsolve('Dy=y*x', 'x')
```

- write ODE here
- use D for derivative

- indicates independent variable
- default independent variable: 't'

Solving IVPs using Matlab

- Matlab command needed: `>> dsolve()`
Its usage is explained with the help of example below.
- Suppose we want to solve IVP

$$\frac{dy}{dx} = xy; \quad y(1) = 1.$$

Then we will use

```
>> y = dsolve('Dy=y*x', 'y(1)=1', 'x')
```

- write ODE here
- use D for derivative

- initial condition

- indicates independent variable
- default independent variable: 't'

Example: Solve $\frac{dy}{dx} = xy; \quad y(1) = 1$

Commands & Output

```
>> y = dsolve('Dy=y*x', 'y(1)=1', 'x')
```

the output will be

```
y=1/exp(1/2)*exp(1/2*x^2)
```

- Try `>> pretty(y)` to see what happens.
- If you want to plot the solution of the IVP, then there are many ways. The easiest is to use `>> ezplot` as explained below.
- To plot the solution of IVP from $x = 0$ to $x = 1$ use
`>> ezplot(y,[0,1])`