Solve a Frist-Order Differential Equation

- Putting your Equation
- Put your Condition if you have
- Using dsolve to solve ODE
- Showing the Graph by using ezplot

Insert Your Equation & Put Your Condition If You Have

```
syms y(x)
Dy = diff(y,x);

cond1 = y(0) == 1;
cond2 = Dy(0) == 0;
conds = [cond1 cond2];

eqn = diff(y,x) == sin(2*x)+cos(3*x)- y
```

```
eqn(x) =
```

$$\frac{\partial}{\partial x}\, y(x) = \cos(3\,x) + \sin(2\,x) - y(x)$$

Solving the Equation

```
ySol(x) = dsolve(eqn,conds)
```

```
ySol(x) =
```

$$\frac{13\,\mathrm{e}^{-x}}{10} + \frac{\sqrt{10}\,\cos(3\,x - \operatorname{atan}(3))}{10} - \frac{\sqrt{5}\,\cos\left(2\,x + \operatorname{atan}\left(\frac{1}{2}\right)\right)}{5}$$

To Simplify the Solution

```
ySol = simplify(ySol(x))
```

```
ySol =
```

$$\frac{\cos(3\,x)}{10} - \frac{2\cos(2\,x)}{5} + \frac{13\,\mathrm{e}^{-x}}{10} + \frac{\sin(2\,x)}{5} + \frac{3\sin(3\,x)}{10}$$

Your Graph Using fplot

You can use ezplot put not recomended

- plots the curve defined by the function `y = f(x)` over the default interval for `x`
- Plots over the specified interval `[xmin xmax]`

```
fplot(ySol , [0 20])
xlim([0.0 20.0])
ylim([-0.82 1.19])
```