

Solving Differential Equations Using Wolfram Mathematica 8:

- Open up a new notebook
- Function you want to use is DSolve – format looks like this:
DSolve[equation, variable 1, variable 2...]
- Then hit shift+enter (evaluate cells)

For example:

```
DSolve[y''[x] + 2y'[x] + y[x] == 0, y, x]
```

Will give you a general solution of y as a function of x.

```
{{y -> Function[{x}, e^{-x} C[1] + e^{-x} x C[2]]}}
```

This can also be used when initial conditions are given:

```
DSolve[{equation, initial condition 1, initial condition 2...}, variable 1, variable 2...]
```

*Note the extra brackets, they are very important! The extra opening one goes right before the diff. eq. and the ending one goes right after the last initial condition

For example:

```
DSolve[{y''[x] + 2y'[x] + y[x] == 0, y'[0] == 0, y[0] == 10}, y, x]
```

Will yield:

```
{{y -> Function[{x}, 10e^{-x}(1 + x)]}}
```

Finding Derivatives:

- First input your function, for example:

```
f[x] = x^2 + 3x
```

- Just type D[function, variable]

- Example from above:

```
D[f[x], x]
```

Will yield:

```
3 + 2x
```