Constant coefficient differential operators.

What is $\frac{d}{dx}$? Well $\frac{d}{dx}[f(x)] = f'(x)$ derivative

The symbol "$\frac{d}{dx}$" represents the operation of differentiation

the operation that takes a function and produces its derivative

$\frac{d}{dx}$ is therefore called the "Derivative operator"

Similarly $\frac{d^2}{dx^2}$ is an operator called the "second derivative operator"

And so on $\frac{d^2}{dx^3}, \ldots, \frac{d^n}{dx^n} =$ nth derivative operator.

Now we can define algebraic operations on operators themselves

If A is an operator, then A^2 does the operation twice

So if $D = \frac{d}{dx}$ then $D^2 =$ take derivative twice $= \frac{d^2}{dx^2}$

and $D^3 = \frac{d^3}{dx^3}, \ldots, D^n = \frac{d^n}{dx^n}$

We can also combine differential operators by addition

$$L = D^2 - 2D + 3$$

this is the operator that multiplies by 3

$$= \frac{d^2}{dx^2} - 2\frac{d}{dx} + 3$$

Then $L[f(x)] = f''(x) - 2f'(x) + 3f(x)$