Calculus and Derivatives

Derivatives are all about the slope aka change in y / change in x

This will give you an average of the rate of change between the 2 points

But how do you find the slope at a specific point? 0 / 0?

Derivatives substitute 0 for a limit approaching 0, aka, a point so small as to be 0

So say we have a line y = x^2

If x starts at 1 and changes to 3 then the slope = (3^2 - 1^2) / (3-1) or 9/2 or 4.5

So for a function y = f(x) the derivative of that function or the slope is:

So if y is equal to the function of x

Then the change in y is equal to the function of x plus the change in x

Or

So we can rewrite the slope equation as:

So going back to y = x^2 or f(x) = x^2

Plugging that into the slope equation we get

Or

Or

So x^2 cancels leaving

Divide by delta x

= 2x +

So as delta x approaches 0

= 2x

So the derivative of x^2 is 2x.

**Rules of derivatives**

<https://www.mathsisfun.com/calculus/derivatives-rules.html>