13.2 DEFINITION OF THE DERIVATIVE

~~ESSENTIAL QUESTION~~:

What is a derivative?

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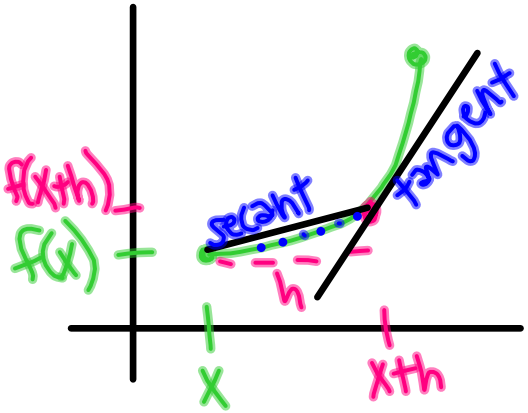
tangent line - instantaneous rate of change.
Derivative is the slope of that line!



$$\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

Notations: $f'(x)$ $\frac{dy}{dx}$ $\frac{d}{dx}$

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~~ESSENTIAL QUESTION~~: What is a derivative?

Derivative at a point

http://goo.gl/efWfaP

Derivative Graph Plotter

http://goo.gl/iQyLNY

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ESSENTIAL QUESTION: What is a derivative?

ex. $f(x)=5x^2$, find $f'(x)$ and $f'(3)$

$$\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$$

$$\lim_{h\to 0}\frac{5(x+h)^2-5x^2}{h}$$

$$\lim_{h\to 0}\frac{5(x^2+2xh+h^2)-5x^2}{h}$$

$$\lim_{h\to 0}\frac{5x^2+10xh+5h^2-5x^2}{h}$$

$$\lim_{h\to 0}\frac{h(10x+5h)}{h}$$

$10x+5(0)$

$f'(x)=10x$

$f'(3)=10(3)$

$\boxed{30}$