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MAT 122

The derivative

The derivative of a function f at a is denoted $f'(a)$ and defined by

$$f'(a) = \lim_{t \to a} \frac{f(a) - f(t)}{a - t}$$

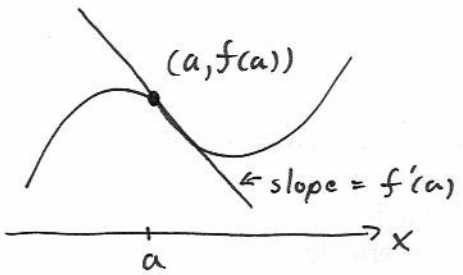
OR

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

Interpretations:

- $f'(a)$ is the instantaneous rate of change of $f(x)$ when $x = a$.

- $f'(a)$ is the slope of the tangent line through the point $(a, f(a))$



$$f'(a) = \text{slope} = \frac{\Delta y}{\Delta x} \Rightarrow$$

$$= \Delta y \text{ if } \Delta x = 1$$

~~f(a) measures the amount~~

- $f'(a)$ measures the amount $y = f(x)$ changes per 1 unit change in x when $x = a$.