Notes for § 3.2

Recall the definition of the derivative of $f(x)$ at $x=a$:

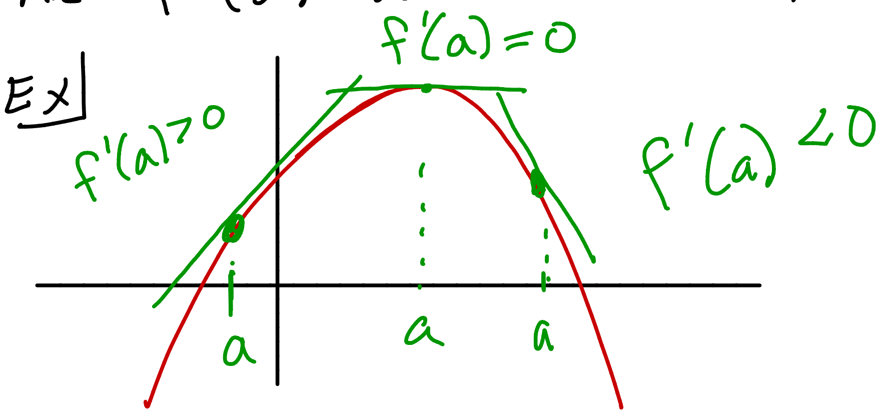
$$\boxed{f'(a) = \lim_{h \to 0} \frac{f(a+h) - f(a)}{h}}$$

← from § 3.1

Seemingly Silly Observation:

- We can apply the $\boxed{\text{pink-box-formula}}$ at any x-value a we want. (ok... maybe the limit won't be defined ...)
- So as the x-value a changes, we expect the $f'(a)$-value (or slope) to change, too.

Ex



picture of the observation that different a's give different f'(a)'s.

Consequence of Silly Observation:
The derivative of the function $f(x)$ is itself a function!! Call it $f'(x)$.

Definition: The derivative, $f'(x)$, of the function $f(x)$ is

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

← Just like the definition from § 3.1 but with a's turned into x's.

Bonus problem at end

$$T(p) = 88 + 35\ln(p) + 8\sqrt{p}$$

a simplified version!

p - pressure measured in pounds per square inch

lb/in^2

T - temperature measured in °F. at which water boils.

Facts:

$T(14.696) = 212.00$

$T'(14.696) = 3.425$ $\boxed{}$

units? meaning

$14.696\ lb/in^2 \approx 1$ atmosphere $\approx$ air pressure @ sea-level