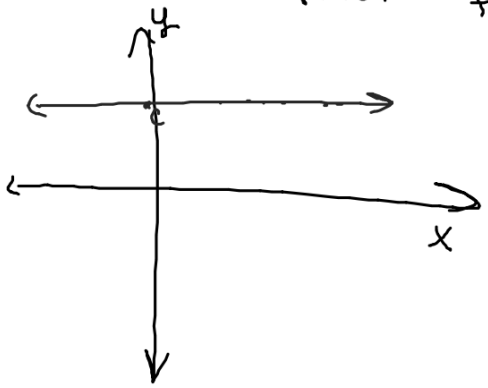
RULES FOR DERIVATIVES (aka the shortcuts)

① IF $f(x)=c$, where c is a constant,
$f'(x)=0$ (constant rule)

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



$= \lim_{h\to 0} \frac{c+h-c}{h} = \lim_{h\to 0} \frac{h}{h} = 0$

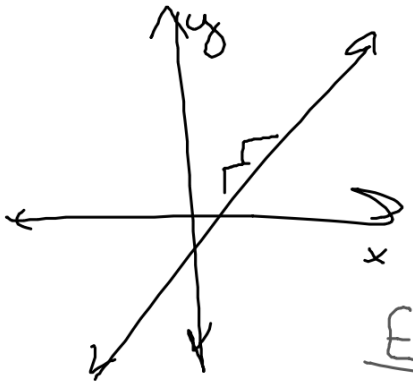
② Constant multiple rule

$$\underset{f(x)=mx+b}{f'(mx+b)} = m \text{, where } m, b \in \mathbb{R}$$

Proof: $f'(x) = \lim_{h \to 0} \frac{m(x+h)+b - mx - b}{h}$

$= \lim_{h \to 0} \frac{\cancel{mx} + mh + \cancel{b} - \cancel{mx} - \cancel{b}}{h}$

$= \lim_{h \to 0} \frac{mh}{h} = m$



Ex $f(x) = 3x + 12$

$f'(x) = 3$