Name: _____ Date: _____

Learning Goal 3.1	Using all basic derivative rules.

Derivative

the slope of the tangent at any point on $y=f(x)$

Derivative Function a GRAPH of the value of the tangent at any point

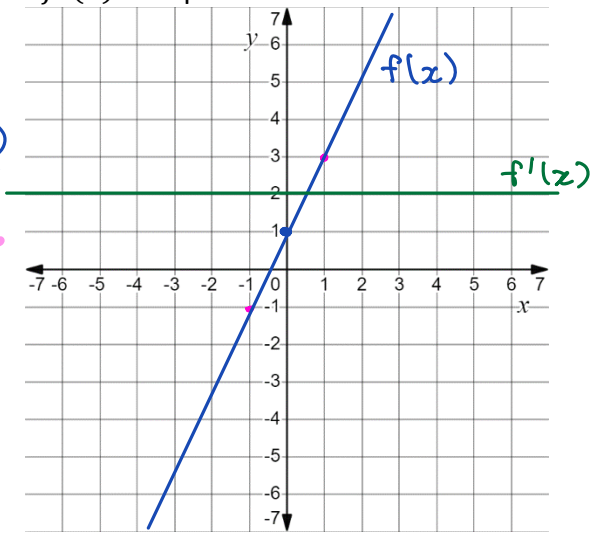
$$\lim_{h\to 0}\frac{f(x+h)-f(x)}{h} = f'(x)$$

GRAPHICALLY
- +/- SLOPE
- inc/dec SLOPE
- SLOPE = 0

Example Given the function $f(x)=2x+1$, determine the equation of $f'(x)$. Graph both functions.

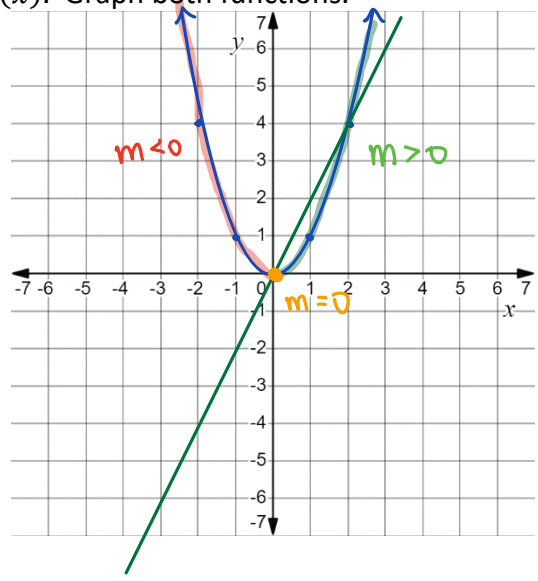
$m = \frac{2}{1}$

$$f'(x) = \lim_{h\to 0}\frac{2(x+h)+1-(2x+1)}{h}$$
$$= \lim_{h\to 0}\frac{2x+2h+1-2x-1}{h}$$
$$= \lim_{h\to 0}\frac{2h}{h}$$
$$= 2$$



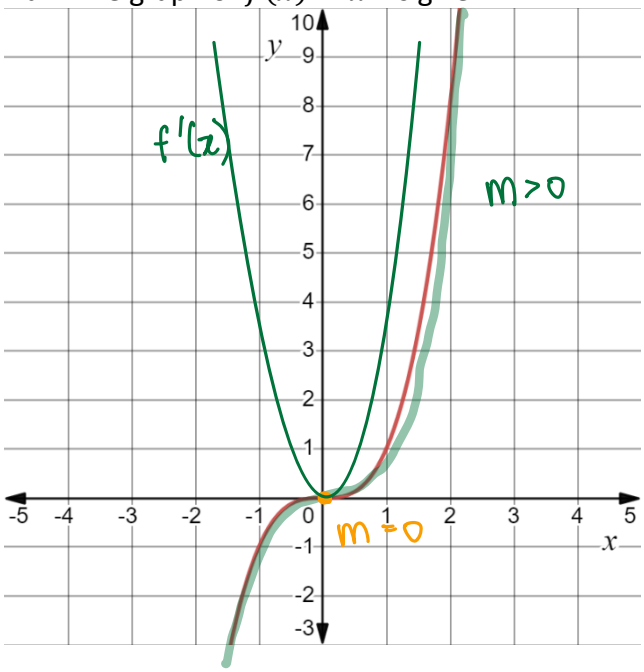
Example Given the function $f(x)=x^2$, determine the equation of $f'(x)$. Graph both functions.

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

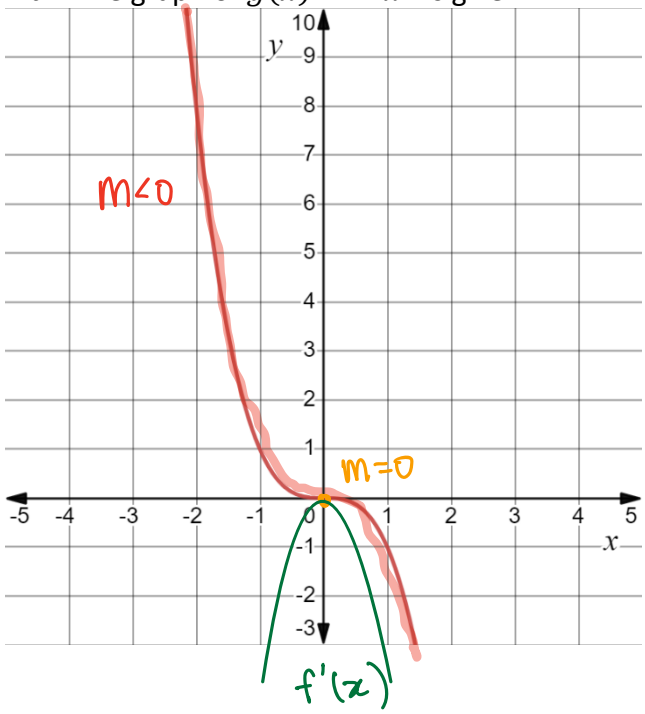


Example Sketch the graph of $f'(x)$ when

a. The graph of $f(x) = x^3$ is given.



b. The graph of $g(x) = -x^3$ is given.



Example Below is the sketch of a function $y = f(x)$. Sketch the graph of its derivative $y = f'(x)$.