The Derivative

Goal: • Can use proper derivative notation to describe the slope of a curve • Can determine if a function is differentiable based on its graph • Understands that derivative is just another word for slope.
Terminology: • Differentiable

Review: Write the slope of the tangent line to the curve $f(x)$ at the point $x = c$.

Now that we are comfortable using this limit, we are going to define this slope at the general point x the **derivative**.

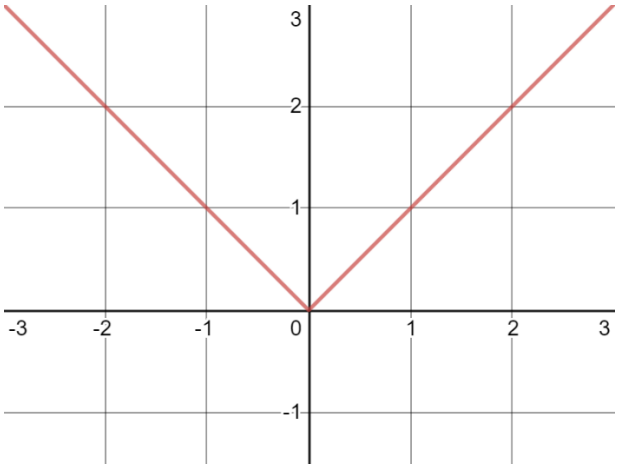
Notation: There are two ways we are going to talk about the derivative

1. Leibnitz's DX Notation

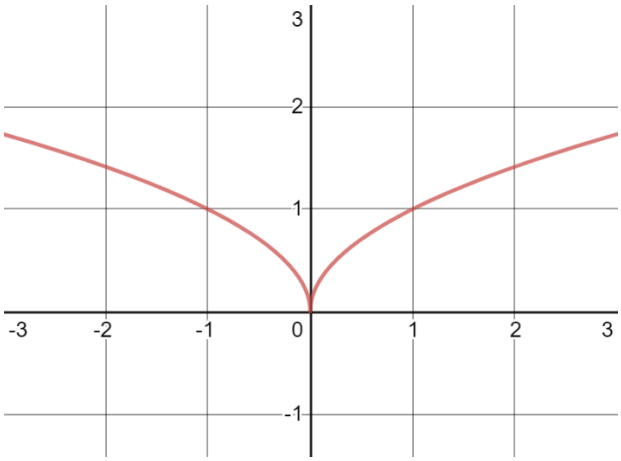
2. Newton's Prime Noation

Graph the derivatives of the following functions

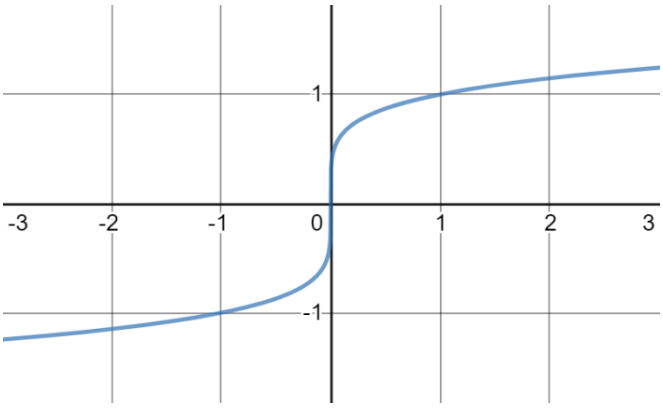
1. $f(x) = |x|$



2. $g(x) = \sqrt{|x|}$

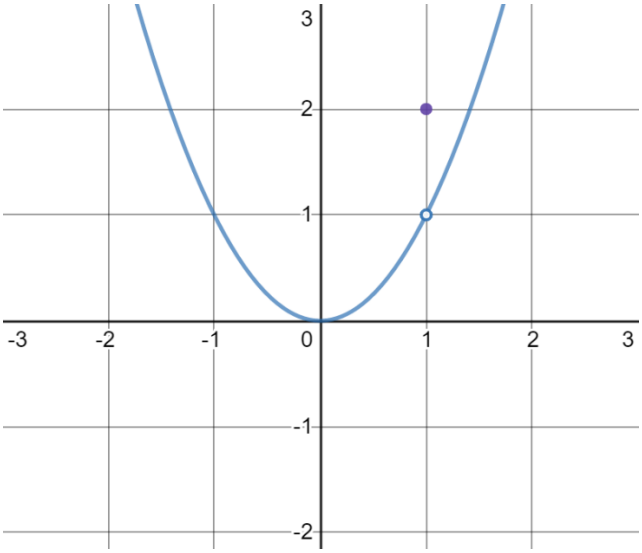


3. $h(x) = \sqrt[5]{x}$



4.

$$k(x) = \begin{cases} x^2, & x \neq 1 \\ 2, & x = 1 \end{cases}$$



Practice Problems: 2.1: # 2-4, 6, 9, 10, 12, 13

1, 11, 14-16

In Class Evidence

6. If $f(x) = \frac{1}{x}$, find $f'(3)$ and use it to find the equation of the tangent to the curve $y = \frac{1}{x}$ at the point $\left(3, \frac{1}{3}\right)$.

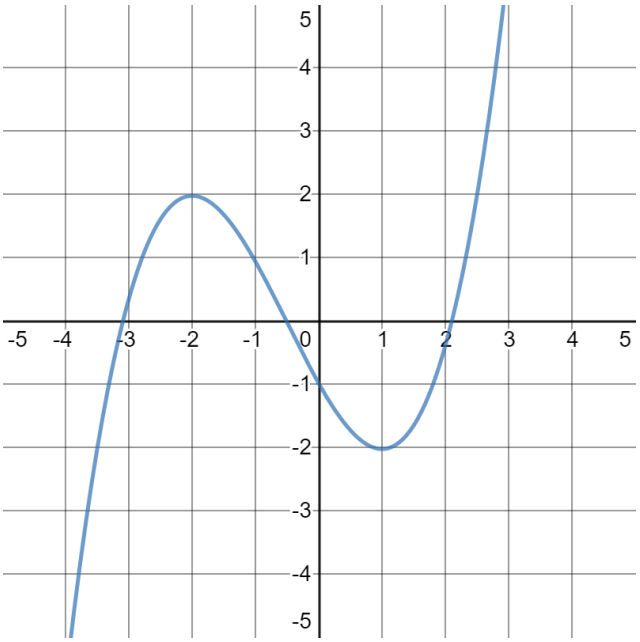
12. Find the derivative $\frac{dy}{dx}$

c. $y = x + \frac{1}{x}$

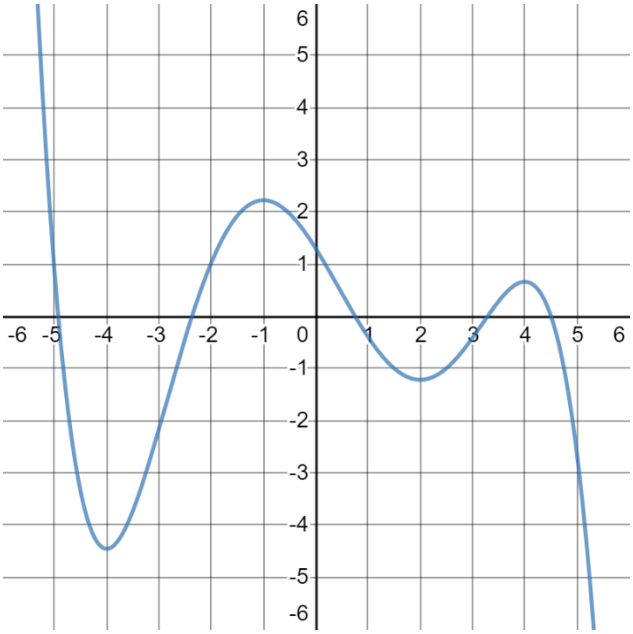
b. $y = 3x^3 + 2x$

13. Given the graphs of f, sketch the graph of f'.

a.



b.



15. Show that $f(x) = x^{\frac{2}{3}}$ is NOT differentiable at $x = 0$ and sketch the curve.