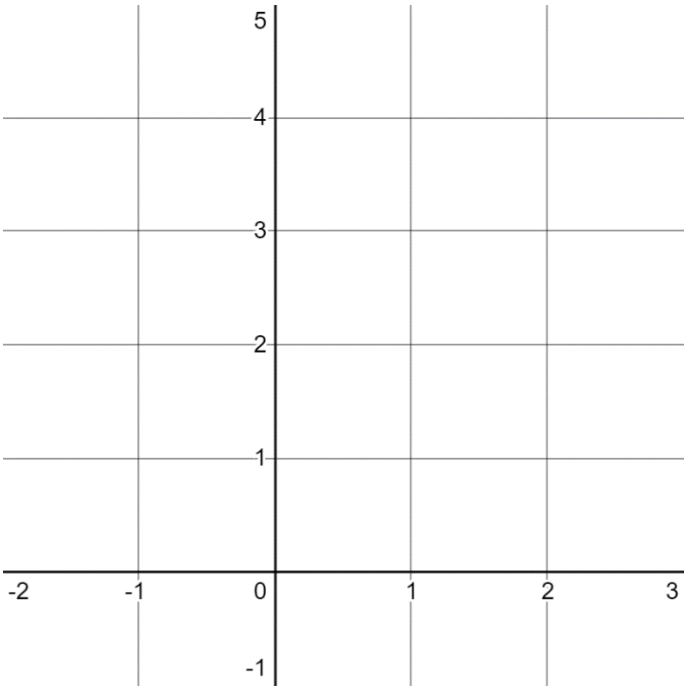
Derivative of the Exponential

Goal: • Can take the derivative of e^x with other derivative rules • Understands that e is built to be its own derivative.
Terminology: • Euler's Number
Reminder: • Make-up Test on Thursday March 5th after school

Review: Sketch the function $f(x) = 2^x$ and $g(x) = 3^x$



On the board try to determine $f'(x)$ and $g'(x)$

From the video we are motivated to find a number $a \in (2.3)$ such that

$$\frac{d}{dx}a^x = a^x \cdot 1$$

We define this base as e

And because of chain rule, we know that if $y = e^{kx}$, then $y' = k \cdot e^{kx}$. So, you can take the derivative of any exponential function by using base e.

Video Example: If $y = 2^x =$

Video Example: If $y = 3^x =$

Practice: Find $f'(x)$ given that:

$$f(x) = \frac{e^{-x^2}}{1 + 5^x}$$

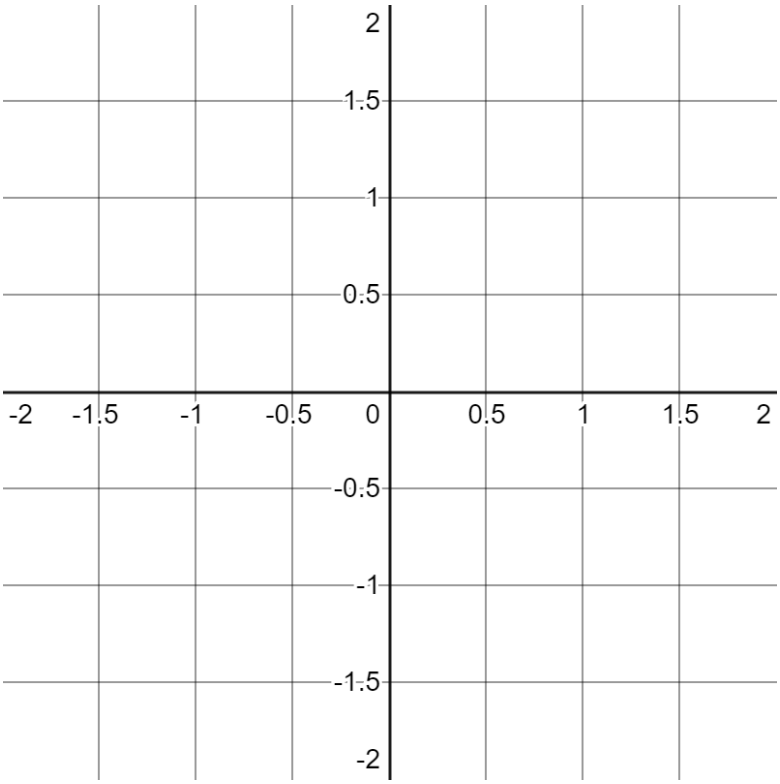
Practice Problems: 8.2: # Example 4, 4 (skip the one with trig), 5, 6, 7-10, 14

8.2 # 16
8.4: # 4abc

In Class Evidence

Example 4. Accurately sketch the graph of

$$y = e^{-x^2}$$



4. Differentiate the following:

$$y = \sqrt{x + e^{1-x^2}}$$

$$y = x5^{\sqrt{x}}$$

6. Find dy/dx if $e^{xy} = 2x + y$

14. Find the solution to $e^x = -x - 1$ accurate to 6 decimal places.

16. Find the millionth derivative of $f(x) = xe^{-x}$