

Logarithmic Differentiation

Goal:

- Can use log laws to take the derivative of very-fast growing functions like x^x
- Can use log laws to take derivative of massive products and quotients

Terminology:

- Logarithmic Differentiation

Reminder:

- Quest on Friday

Review: Find y' given the following (you probably want to do this on the board...)

$$y = \ln \sqrt{\frac{(5-x)^3 \cdot \ln(x^2+1)}{e^{6x} \cdot \sqrt[3]{-4x+7}}}$$

What does this problem teach us?

Example: Find dy/dx if

$$y = x^x$$

Practice: Find dy/dx if

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

Practice: Find dy/dx if

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

Practice Problems: 8.6: # 1, 2abe, 3, 4



3 but tangent line passes through (2,0).

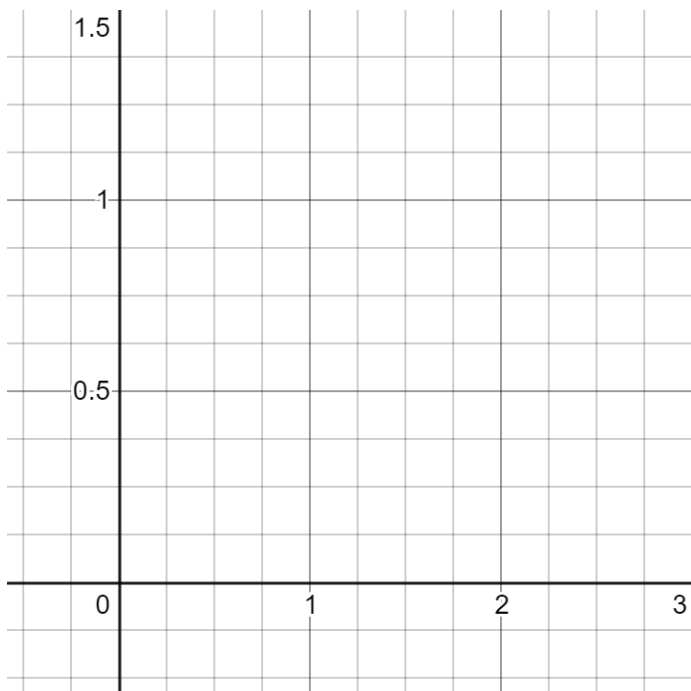
Solution $y = a^a (\ln a + 1) (x - 2)$, where $a = 2.51971151 \dots$ or $0.210392243 \dots$

In Class Evidence

4. Accurately sketch the graph of

$$y = x^{-\ln x}$$

Compute the $\lim_{x \rightarrow 0^+} x^{-\ln x}$ and $\lim_{x \rightarrow \infty} x^{-\ln x}$ by writing $x^{-\ln x} = e^{\ln(x^{-\ln x})}$ and simplifying.



1. Differentiate the following:

$$y = \frac{x\sqrt{x+1}}{(x+2)(x^3+1)}$$

$$y = \sqrt{\frac{x^2+1}{x^2+4}}$$

2. Differentiate the following

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

$$y = \ln^x x$$

3. (Spicy) Find the equations of the tangent line to the curve $y = x^x$ at the point $(2, 0)$