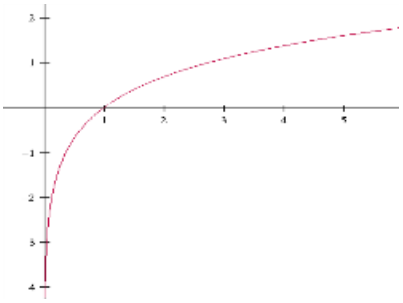
§5.1: Log Derivatives

"I WILL …

…solve logarithms using set derivative rules."

I. Natural Log Graphs



A. Domain: (0, ∞)

B. Range: (–∞, ∞)

C. Continuous Function

D. One-to-One Function

E. Concaves Down

II. Log Properties

A. $\ln(1) =$ _____

B. $\ln(ab) =$ _____

C. $\ln(a^n) =$ _____

D. $\ln\left(\frac{a}{b}\right) =$ _____

III. Log Derivative Rules

A. $\frac{d}{dx}[e^x] =$ _____

B. $\frac{d}{dx}[\ln(u)] =$ _____, $u > 0$

IV. Steps

A. Use the log properties FIRST

B. Apply the derivative

C. Simplify

Ex 1: Solve $\frac{dy}{dx}$ if $y = [\ln(2x)]$	Ex 2: Solve for the derivative for $f(x) = [\ln(x^2 + 1)]$

Ex 3: Solve for the derivative for the derivative: $f(x) = (\ln x)^5$ Hint: cannot use $\frac{u'}{u}$ on this problem because of the exponent	Ex 4: Solve for the derivative for the derivative: $f(x) = \ln(x^4)$
Your Turn: Solve for the derivative for the derivative: $f(x) = x\ \ln(x)$	Ex 5: Solve for the derivative for the derivative: $f(x) = \left[\ln\sqrt{(x^2-3)}\right]$
Ex 6: Solve $\frac{dy}{dx}$ if $y = \left[\sqrt{x}\cdot\ln(x)\right]$	Ex 7: Solve $\frac{dy}{dx}$ if $y = \ln\left(\sqrt{\frac{x+1}{x-1}}\right)$
Your Turn: Solve $\frac{dy}{dx}$ if $y = \ln\frac{x}{\sqrt{x^2+2}}$	Ex 8: Solve $\frac{dy}{dx}$ if $y = \ln\lvert\cos x\rvert$
Your Turn: Solve $\frac{dy}{dx}$ if $y = \ln\lvert\csc x\rvert$	

AP 1) Solve $\frac{dy}{dx}$ for $y = \ln\sqrt{x^2+4}$

(A) $\frac{1}{x}$ (B) $\frac{x}{\sqrt{x^2+4}}$ (C) $\frac{x}{x^2+4}$ (D) $\frac{2x}{\sqrt{x^2+4}}$

Vocabulary	Process and Connections	Answer and Justifications

Assignment: Page 325: 5-8 all, 41-63 odd (omit 55), 64, 65A, 73, 75