

Preview of Section 4.5 Basic Definitions

Derivatives of Logs & Exponents

BASICS

① Derivative with respect to $x = \frac{d}{dx} [\ln x] = \frac{1}{x}$

② $\frac{d}{dx} [\log_b x] = \frac{1}{x \ln b}$

③ $\frac{d}{dx} [e^x] = e^x$

④ $\frac{d}{dx} [b^x] = b^x \ln b$

Example 1: $f(x) = e^{(3x)}$, so $f'(x) = 3e^{3x}$

Example 2: $f(x) = e^{x^2-2}$, so $f'(x) = 2x \cdot e^{x^2-2}$
 $\frac{d}{dx}(x^2-2)$

Example 3: $f(x) = 3^x$, so $f'(x) = 3^x \ln 3$

Example 4: $f(x) = 4^{2x+1}$, so $f'(x) = 4^{2x+1} \ln 4 * 2$
main piece * derivative of power

$= (2 * \ln 4) * 4^{2x+1}$

Example 5: $f(x) = \ln |2x-4|$
 $f'(x) = \frac{1}{2x-4}$ then take derivative (Chain Rule) from $|2x-4|$

, so $f'(x) = \frac{2}{2x-4} = \frac{1}{x-2}$

Example 6: $f(x) = \log_4(3x-1)$ $f'(x) = \frac{1}{(3x-1)\ln 4} * 3$

, so $f'(x) = \frac{3}{(3x-1)\ln 4}$