













e differentiate exponential and

Derivative of $\log_{a} x$

If *u* is a differentiable function of *x* and *u* > 0, $\frac{d}{dx}\log_a u = \frac{1}{u \ln a} \frac{du}{dx}$

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p. 175





EQ: How do we differentiate exponential and p. 176 Rule 10 Power Rule For Arbitrary Real Powers If u is a positive differentiable function of x and n is any real number, then u^n is a differentiable function of x, and $\frac{d}{dx}u^n = nu^{n-1}\frac{du}{dx}$ Slide 3- 17





<i>p. 177</i> EQ: How do we differentiate exponential and logarithmic functions?	
Logarithmic Differentiation	
Sometimes the properties of logarithms can be used to sin the differentiation process, even if logarithms themselves introduced as a step in the process.	nplify must be
The process of introducing logarithms before differentiating is called <i>logarithmic differentiation</i> .	
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EQ: How do we differentiate exponential and logarithmic functions?		
Example Logarithmic Differentiati Find $\frac{dy}{dx}$ for $y = \frac{(x-2)^2}{\sqrt{x^2+1}}$ $\boxed{\ln y = 2\ln(x-2) - \frac{1}{2}\ln(x^2+1)}$	on	
$\frac{1}{y}\frac{dy}{dx} = \frac{2}{x-2} - \frac{1}{2}\left(\frac{2x}{x^2+1}\right)$		
$\frac{dy}{dx} = y \left[\frac{2}{x-2} - \frac{1}{2} \left(\frac{2x}{x^2+1} \right) \right] = \frac{(x-2)^2}{\sqrt{x^2+1}} \left[\frac{2}{x-2} - \frac{1}{2} \left(\frac{2x}{x^2+1} \right) \right]$		
$\frac{dy}{dx} = \frac{2(x-2)}{\sqrt{x^2+1}} - \frac{x(x-2)^2}{(x^2+1)^{5/2}} = \frac{2(x-2)(x^2+1) - x(x-2)^2}{(x^2+1)^{5/2}} = \frac{(x-2)(x^2+2x+2)}{(x^2+1)^{5/2}}$		
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