

## 3.6 Derivatives of Logarithmic Functions

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# The derivative of log

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$$\frac{d}{dx}(\ln x) = \frac{1}{x}$$

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- $$\frac{d}{dx}(\ln x) = \frac{1}{x}$$

- $$\frac{d}{dx}(\log_a x) = \frac{1}{x \ln a}$$

Fact

$$\frac{d}{dx} \ln g(x) = \frac{g'(x)}{g(x)}.$$

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- $y = \ln(\cos x)$
- $y = \sqrt[3]{\ln x}$ .
- $y = x \ln(1 + e^x)$
- $y = \frac{1 + \ln x}{1 - \ln x}$

## Example

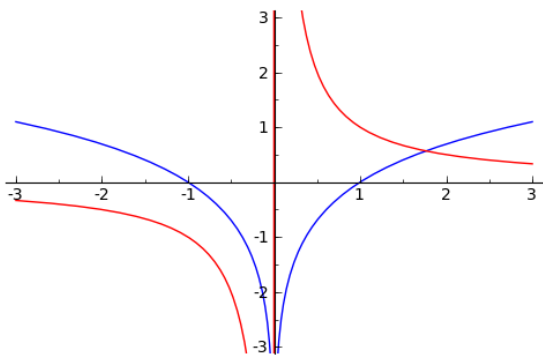
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- *Take natural logarithms of both sides of an equation  $y = f(x)$  and use the Laws of Logarithm to simplify*
- *Differentiate implicitly with respect to  $x$*
- *Solve the resulting equation for  $y'$ .*



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- $y = x^x$
- $y = x^{\cos x}$
- $y = (\ln x)^{\sin x}$