

Differentiating natural exponential & logarithms $\frac{d}{dx}(e^{ax}) = ae^{ax}$
 $\frac{d}{dx}(\ln(ax+b)) = \frac{a}{ax+b}$

$$\frac{d}{dx}(e^{4x})$$

$$\frac{d}{dz}\left(\ln\left(\frac{31}{28}z\right)\right)$$

$$\frac{d}{dx}\left(\frac{1}{\sqrt{e^{3x}}}\right)$$

$$\frac{d}{dx}\left(\ln(\sqrt{7x^3})\right)$$

$$\frac{d}{dt}(\ln(5t))$$

$$\frac{d}{dt}\left(\ln\left(\frac{t+2}{t+3}\right)\right)$$

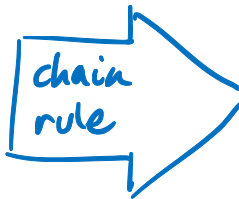
Differentiating natural exponential & logarithms

$$\frac{d}{dx}(e^{ax}) = ae^{ax}$$

$$\frac{d}{dx}(\ln(ax+b)) = \frac{a}{ax+b}$$

$$\frac{d}{dx}(e^x) = e^x$$

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



$$\frac{d}{dx}(e^{f(x)}) = f'(x)e^{f(x)}$$

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

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$$\frac{d}{dx}(e^{ax}) = ae^{ax}$$

$$\frac{d}{dx}(\ln(ax+b)) = \frac{a}{ax+b}$$

$$\frac{d}{dx}(e^{4x}) = 4e^{4x}$$

\uparrow
 $a=4$

$$\begin{aligned}\frac{d}{dx}\left(\frac{1}{\sqrt{e^{3x}}}\right) &= \frac{d}{dx}\left(e^{-\frac{3}{2}x}\right) \\ &= -\frac{3}{2}e^{-\frac{3}{2}x}\end{aligned}$$

$$\frac{1}{t} = t^{-1}, \quad \sqrt{y} = y^{\frac{1}{2}}, \quad (a^n)^m = a^{nm}$$

$$\frac{1}{\sqrt{z}} = (z^{\frac{1}{2}})^{-1} = z^{-\frac{1}{2}}$$

$$\frac{1}{\sqrt{e^{3x}}} = (e^{3x})^{-\frac{1}{2}} = e^{-\frac{3}{2}x}$$

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$$\frac{d}{dt}(\ln(5t)) = \frac{5}{5t+0} = \frac{5}{5t} = \frac{1}{t}$$

$a=5$ \rightarrow $b=0$

If $b=0$

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

$$\frac{d}{dz}(\ln(\frac{31}{28}z)) = \frac{1}{z}$$

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$$\begin{aligned} \frac{d}{dx}(\ln(\sqrt{7x^3})) &= \frac{d}{dx}\left(\frac{1}{2}\ln 7 + \frac{3}{2}\ln(x)\right) \\ &= 0 + \frac{3}{2} \frac{d}{dx}(\ln(x)) \\ &= \frac{3}{2} \frac{1}{x} \\ &= \underline{\underline{\frac{3}{2x}}} \end{aligned}$$

$$\ln(a^b) = b \ln(a)$$

$$\ln(ab) = \ln(a) + \ln(b)$$

$$\sqrt{t} = t^{1/2}$$

$$\sqrt{7x^3} = (7x^3)^{1/2}$$

$$\ln(\sqrt{7x^3}) = \frac{1}{2} \ln(7x^3)$$

$$= \frac{1}{2}(\ln(7) + \ln(x^3))$$

$$= \frac{1}{2}(\ln(7) + 3\ln(x))$$

$$\begin{aligned} \frac{d}{dt}\left(\ln\left(\frac{t+2}{t+3}\right)\right) &= \frac{d}{dt}(\ln(t+2) - \ln(t+3)) \\ &= \frac{1}{t+2} - \frac{1}{t+3} \\ &= \underline{\underline{\frac{1}{t+2} - \frac{1}{t+3}}} \end{aligned}$$

$$\ln\left(\frac{a}{b}\right) = \ln(a) - \ln(b)$$

$$\ln\left(\frac{a}{b}\right) = \ln(ab^{-1})$$

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$$\frac{1}{t} = t^{-1}, \sqrt{y} = y^{\frac{1}{2}}, (a^n)^m = a^{nm}$$

$$\frac{d}{dx}\left(\frac{1}{\sqrt{e^{3x}}}\right) = \frac{d}{dx}\left(e^{-\frac{3}{2}x}\right) = -\frac{3}{2}e^{-\frac{3}{2}x}$$

$$\frac{1}{\sqrt{z}} = (\sqrt{z})^{-1} = (z^{\frac{1}{2}})^{-1} = z^{-\frac{1}{2}}$$

$$\frac{1}{\sqrt{e^{3x}}} = (e^{3x})^{-\frac{1}{2}} = e^{-\frac{3x}{2}}$$

$$\frac{d}{dt}(\ln(5t)) = \frac{5}{5t} = \frac{1}{t}$$

if $b=0$

$$\ln(a^b) = b \ln(a)$$

$$\frac{d}{dz}\left(\ln\left(\frac{31}{28}z\right)\right) = \frac{1}{z}$$

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

$$\frac{d}{dx}(\ln(\sqrt{7x^3})) = \frac{d}{dx}(\ln(7x^3)^{\frac{1}{2}})$$

$$\frac{d}{dt}\left(\ln\left(\frac{t+2}{t+3}\right)\right)$$