Calculus I

§Derivative of $a\ln(bx+c)$

Todor Milev

2019

Example

Compute the indicated derivative.

$$
\begin{aligned}
\frac{\mathrm{d}}{\mathrm{d}x}\left(2\ln(3x-1)\right) &= 2\cdot\frac{\mathrm{d}}{\mathrm{d}x}\left(\ln(3x-1)\right) \\
&= 2\cdot\frac{\mathrm{d}}{\mathrm{d}x}\left(\ln u\right) \qquad \Big| \text{ Set } 3x-1=u \\
&= 2\cdot\frac{\mathrm{d}}{\mathrm{d}u}(\ln u)\cdot\frac{\mathrm{d}u}{\mathrm{d}x} \\
&= 2\cdot\frac{1}{u}\cdot\frac{\mathrm{d}}{\mathrm{d}x}(3x-1) \\
&= 2\cdot\frac{1}{3x-1}\cdot 3 \\
&= \frac{6}{3x-1}
\end{aligned}
$$