Calculus I
§Derivative of reciprocal of linear polynomial

Todor Milev

2019

$$\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2}$$

Example

Compute the derivative. Use the quotient rule.

$$\frac{\mathsf{d}}{\mathsf{d}x}\left(\frac{1}{2x-1}\right)$$

Product rule

$$\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2}$$

Example

Compute the derivative. Use the quotient rule.

$$\frac{\mathrm{d}}{\mathrm{d}x}\left(\frac{1}{2x-1}\right) \;=\; \textbf{?}$$

Product rule

$$\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2}$$

Example

Compute the derivative. Use the quotient rule.

$$\frac{\mathrm{d}}{\mathrm{d}x}\left(\frac{1}{2x-1}\right) \;=\; \frac{(1)'(2x-1) - 1\cdot(2x-1)'}{(2x-1)^2} \qquad \text{Product rule}$$

$$\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2}$$

Example

Compute the derivative. Use the quotient rule.

$$\frac{\mathsf{d}}{\mathsf{d}x}\left(\frac{1}{2x-1}\right) = \frac{(1)'(2x-1) - 1\cdot(2x-1)'}{(2x-1)^2} \quad \Big| \quad \text{Product rule}$$

$$\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2}$$

Example

Compute the derivative. Use the quotient rule.

$$\frac{\mathrm{d}}{\mathrm{d}x}\left(\frac{1}{2x-1}\right) \;=\; \frac{(1)'(2x-1) - 1\cdot(2x-1)'}{(2x-1)^2} \qquad \Big| \;\; \text{Product rule}$$

$$\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2}$$

Example

Compute the derivative. Use the quotient rule.

$$
\begin{aligned}
\frac{\mathrm{d}}{\mathrm{d}x}\left(\frac{1}{2x-1}\right) &= \frac{(1)'(2x-1) - 1\cdot(2x-1)'}{(2x-1)^2} & \text{Product rule} \\
&= \frac{\textbf{?}\cdot(2x-1) - \textbf{?}}{(2x-1)^2}
\end{aligned}
$$

$$\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2}$$

Example

Compute the derivative. Use the quotient rule.

$$
\begin{aligned}
\frac{\mathsf{d}}{\mathsf{d}x}\left(\frac{1}{2x-1}\right) &= \frac{(1)'(2x-1) - 1\cdot(2x-1)'}{(2x-1)^2} \quad \bigg|\ \text{Product rule} \\
&= \frac{0\cdot(2x-1) - \textbf{?}}{(2x-1)^2}
\end{aligned}
$$

$$\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2}$$

Example

Compute the derivative. Use the quotient rule.

$$
\begin{aligned}
\frac{\mathrm{d}}{\mathrm{d}x}\left(\frac{1}{2x-1}\right) &= \frac{(1)'(2x-1) - 1 \cdot (2x-1)'}{(2x-1)^2} \quad\bigg|\ \text{Product rule} \\
&= \frac{0 \cdot (2x-1) - \mathbf{?}}{(2x-1)^2}
\end{aligned}
$$

$$\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2}$$

Example

Compute the derivative. Use the quotient rule.

$$
\begin{aligned}
\frac{\mathrm{d}}{\mathrm{d}x}\left(\frac{1}{2x-1}\right) &= \frac{(1)'(2x-1) - 1 \cdot (2x-1)'}{(2x-1)^2} \quad\bigg|\ \text{Product rule} \\
&= \frac{0 \cdot (2x-1) - 2}{(2x-1)^2}
\end{aligned}
$$

$$\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2}$$

Example

Compute the derivative. Use the quotient rule.

$$
\begin{aligned}
\frac{d}{dx}\left(\frac{1}{2x-1}\right) &= \frac{(1)'(2x-1) - 1 \cdot (2x-1)'}{(2x-1)^2} & \text{Product rule} \\
&= \frac{0 \cdot (2x-1) - 2}{(2x-1)^2} \\
&= \frac{-2}{(2x-1)^2}
\end{aligned}
$$

$$\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2}$$

Example

Compute the derivative. Use the quotient rule.

$$
\begin{aligned}
\frac{\mathrm{d}}{\mathrm{d}x}\left(\frac{1}{2x-1}\right) &= \frac{(1)'(2x-1) - 1\cdot(2x-1)'}{(2x-1)^2} & \quad\text{Product rule}\\
&= \frac{0\cdot(2x-1) - 2}{(2x-1)^2}\\
&= \frac{-2}{(2x-1)^2}
\end{aligned}
$$