

Suppose $f(x) = 3x - 2$ and $g(x) = x^2 - 1$. Find the derivative $h'(x)$ of their quotient, $h(x) = \frac{3x - 2}{x^2 - 1}$, and write your answer in simplified form.

Solution: By the quotient rule,

$$\begin{aligned} h'(x) &= \frac{f'(x)g(x) - g'(x)f(x)}{(g(x))^2} \\ &= \frac{3(x^2 - 1) - 2x(3x - 2)}{(x^2 - 1)^2} \\ &= \frac{3x^2 - 3 - 6x^2 + 4x}{(x^2 - 1)^2} \\ &= \frac{-3x^2 + 4x - 3}{(x^2 - 1)^2} \end{aligned}$$