Wednesday, February 26, 2020

2.4 The Quotient Rule

Yesterday you had to rewrite rational functions as products raised to negative powers to take their derivative. There is a rule that allows us to work directly from rational form.

The Quotient Rule

In words : The derivative of the top times the bottom minus the top times the derivative of the bottom, all over the bottom squared.

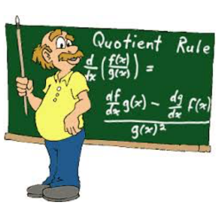
Algebraically: If $h(x) = \frac{f(x)}{g(x)}$, then $h'(x) = \frac{f'(x)g(x) - f(x)g'(x)}{[g(x)]^2}$

Try it! Differentiate $h(x) = \frac{2x-3}{x^2+2x}$

It is important to note that order matters in the Quotient Rule!

Proof: We will use the product rule to prove the quotient rule.

$$h(x) = \frac{f(x)}{g(x)}$$



Practice Problems:

1. Use the quotient rule to differentiate $h(x) = \dfrac{x^3 + 2x - 3}{x^2 + 5}$. Simplify your answer.

2. Determine the coordinates of each point on the graph of $h(x) = \dfrac{2x + 8}{\sqrt{x}}$ where the tangent is horizontal.

3. Determine the equation of the tangent to $y = \dfrac{2x}{x^2 + 1}$ when x = -1.

QUOTIENT RULE:

IF $h(x) = \dfrac{f(x)}{g(x)}$

$$h'(x) = \frac{f'(x) \cdot g(x) - f(x) \cdot g'(x)}{g(x)^2}$$