Product Rule

Goal: • Can use product rule to take the derivative of product of polynomial and radical functions • Understands how to visualize product rule as changing area
Terminology: • Product Rule

We know how to take the derivative of a power and a sum already:

$$\frac{d}{dx}x^n = nx^{n-1}$$

$$\frac{d}{dx}(f+g) = \frac{df}{dx} + \frac{dg}{dx}$$

But now we want to take the derivative of a product:

$$\frac{d}{dx}(f \cdot g)$$

Show that the derivative does not distribute through multiplication like it does with addition. That is show

$$\frac{d}{dx}(f \cdot g) \neq \frac{df}{dx} \cdot \frac{dg}{dx}$$

So, the question remains, what should the derivative be?

Example: Consider the following

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
3	4	-2	6	3

Determine the equation of the tangent line to the curve $y = f(x) \cdot g(x) + x^2$ at the point $(3, -1)$

Example: Determine the domain of $\frac{dy}{dx}$ and evaluate $y'(1)$ for the function

$$y = (x^3 + 5x^2 - 4x)\left(\sqrt{x} - \frac{1}{x}\right)$$

Practice Problems: 2.3: # 1-3 (do what you need), 4, 6, 7, 8, 10

9, 11 (do 8 and 10 first)