The Product and Quotient Rules

MTH 201 -- Module 5A part 1

The derivative of $f(t) \cdot g(t)$ (the product of two functions) is

- $f'(t) \cdot g'(t)$ (The product of the derivatives)
- $f'(t)g(t) + f(t)g'(t)$
- $f'(t)g(t) - f(t)g'(t)$
- $g'(t)f(t) - f'(t)g(t)$
- None of the above

The derivative of $f(t)/g(t)$ is

$f'(t)/g'(t)$ (the quotient of the derivatives)

$$\frac{f'(t)g(t)+f(t)g'(t)}{(g(t))^2}$$

$$\frac{f'(t)g(t)-f(t)g'(t)}{(g(t))^2}$$

$$\frac{g'(t)f(t)-f'(t)g(t)}{(g(t))^2}$$

$$\frac{f'(t)g(t)-f(t)g'(t)}{(g'[(t))^2}$$

Tc 0

The Quotient Rule Song

$$\frac{d}{dx}\left[\frac{\mathrm{Hi}}{\mathrm{Lo}}\right] = \frac{\mathrm{Lo}\frac{d}{dx}[\mathrm{Hi}] - \mathrm{Hi}\frac{d}{dx}[\mathrm{Lo}]}{\mathrm{LoLo}}$$

Full song (!) at https://www.youtube.com/watch?v=P7sKe46F8kY

The derivative of f(t)g(t)
is not just f'(t)g'(t)

The derivative of f(t)/g(t)
is not just f'(t)/g'(t)

Activity 2.3.2. Use the product rule to answer each of the questions below. Throughout, be sure to carefully label any derivative you find by name. It is not necessary to algebraically simplify any of the derivatives you compute.

a. Let $m(w) = 3w^{17}4^w$. Find $m'(w)$.

b. Let $h(t) = (\sin(t) + \cos(t))t^4$. Find $h'(t)$.

c. Determine the slope of the tangent line to the curve $y = f(x)$ at the point where $a = 1$ if f is given by the rule $f(x) = e^x \sin(x)$.

Activity 2.3.3. Use the quotient rule to answer each of the questions below. Throughout, be sure to carefully label any derivative you find by name. That is, if you're given a formula for $f(x)$, clearly label the formula you find for $f'(x)$. It is not necessary to algebraically simplify any of the derivatives you compute.

a. Let $r(z) = \frac{3^z}{z^4+1}$. Find $r'(z)$.

b. Let $v(t) = \frac{\sin(t)}{\cos(t)+t^2}$. Find $v'(t)$.

c. Determine the slope of the tangent line to the curve $R(x) = \dfrac{x^2 - 2x - 8}{x^2 - 9}$ at the point where $x = 0$.

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