Name _____ AP Calculus AB

3.3 Rules for Differentiation Chapter 3 day 7

5) The Product Rule: The product of two differentiable functions u and v is also differentiable and

$$\frac{d}{dx}(uv) = uv' + vu' = u\frac{dv}{dx} + v\frac{du}{dx}$$

$$(fg)' =$$

In words:

Example: Find $f'(x)$ if $f(x) = (x^2 + 1)(x^3 + 3)$

Example: Let $y = uv$. Find $y'(2)$ if $u(2) = 3,\ u'(2) = -4,\ v(2) = 1,\ v'(2) = 2$

6) Quotient Rule: If u and v are differentiable then $y = \frac{u}{v}$ is differentiable and

$$\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2}$$

$$\left(\frac{f}{g}\right)' = \_\_\_\_\_$$

In words:

Example: Find $f'(x)$ if $f(x) = \frac{x^2 - 1}{x^2 + 1}$

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3.3 Rules for Differentiation Chapter 3 day 7

Example: Find an equation for the line tangent to the curve $y = \frac{x^2 + 3}{2x}$ at the point (1, 2). Check graphically if your answer makes sense.

Higher order derivatives: We can take derivatives of derivatives

Example:

$y = x^4 + 2x^3$

$y' = \frac{dy}{dx} =$

$y'' = \frac{d^2y}{dx^2} =$

$y''' = \frac{d^3y}{dx^3} =$

Homework: Page 120 # 11 through 35 odd