

Ch. 2.3 Notes Product and Quotient Rules

Product Rule: formula used to find the derivatives of products of two or more functions

$$* \frac{d}{dx} [f(x) \cdot g(x)] = f'(x)g(x) + f(x)g'(x)$$

"f prime g plus f g prime"

Ex. 1 $y = \underbrace{(3x - 2x^2)}_{f(x)} \underbrace{(5 + 4x)}_{g(x)}$ Find $\frac{dy}{dx}$

Quotient Rule: formula for finding derivative of function that is the quotient of two other functions.

$$* \frac{d}{dx} \left[\frac{f(x)}{g(x)} \right] = \frac{f'(x)g(x) - f(x)g'(x)}{[g(x)]^2}$$

Ex. 2 $y = \frac{3x - 2x^2}{5 + 4x}$ Find y'

Higher order derivatives

Ex. 3 $y = 2x^5 + x^4 - 3x^3 - 8x^2 + 10x - 12$. Find y''''

$$\begin{aligned} y' &= \\ y'' &= \\ y''' &= \\ y'''' &= \end{aligned}$$

* Notations

Notations for 1st derivative: $f'(x)$, $g'(x)$, y' , $\frac{dy}{dx}$

Notation for 2nd derivative: $f''(x)$, $y''(x)$, y'' , $\frac{d^2y}{dx^2}$

*Note: This means "2nd derivative"
NOT "square the 1st derivative"

Notation for 3rd derivative: $f'''(x)$, y''' , $\frac{d^3y}{dx^3}$