Basic Derivative Rules
2.3 – Product Rule

Product Rule

Newton's Notation

$$(f \cdot g)' = f' \cdot g + f \cdot g'$$

Product Rule

Leibniz's Notation

$$\frac{d}{dx}(f \cdot g) = \left(\frac{d}{dx}f\right) \cdot g + f \cdot \left(\frac{d}{dx}g\right)$$

Ex A: Use the Product Rule and Newton's Notation to find the derivative of each product.

#1) $x^4 \cdot x^6$

Ex B: Use the Product Rule and Leibniz's Notation to find the derivative of each product.

#1) $x^4(4x^7 - 3x^2 + 12)$

#2) $y = (x^3 - x^2 + 7)(x^4 + 3)$

#2) $y = \frac{15x+1}{x^3}$

Ex C: Answer the following word problems.

PS4 sales

#1) After selling PS4s for t weeks, the total sales are $S(t) = t^3(16 - t^2)$ thousand PS4s for the first 3 weeks of sales. Find the rate of change after week 2.

Weeds

#2) After pulling weeds for t days, the total number of weeds in a flower garden can be represented by $W(t) = (t^2 + 1)(t^3 - 1)$ weeds. Find the rate of change after 8 days.