

2.4 Day 2 - The Chain Rule

11/26/18

- Homework:
- 2.4 B
 - 2.4 PA Friday 11/30
 - 2.1-2.4 Test - Wednesday 12/5

Objective: Find derivatives using the Chain Rule with product and quotient rule.



Do Now: Simplify the following expression by writing as one fraction without negative exponents.

$$(3 - x^3)^{\frac{1}{2}} - x^3 (3 - x^3)^{-\frac{1}{2}}$$

*Do Now*

Simplify the following expression by writing as one fraction without negative exponents.

$$(3 - x^3)^{\frac{1}{2}} - x^3 (3 - x^3)^{-\frac{1}{2}}$$

$$\frac{\sqrt{3-x^3} \cdot \sqrt{3-x^3}}{\sqrt{3-x^3}} - \frac{x^3}{\sqrt{3-x^3}}$$

$$\frac{3-x^3-x^3}{\sqrt{3-x^3}} = \frac{3-2x^3}{\sqrt{3-x^3}}$$



Examples - Requiring Chain Rule with products and quotients.

$$1) \quad y = \underline{6x^2} \cdot (\underline{3x-9})^3$$

$$y' = 12x(3x-9)^3 + \underline{6x^2} (\underline{3(3x-9)^2} \cdot \underline{3})$$

$$y' = 12x(3x-9)^3 + 54x^2(3x-9)^2$$

$$y' = 6x(3x-9)^2 (2 \overset{6x-18}{(3x-9)} + \overset{+9x}{9x})$$

$$y' = \underline{6x} (3x-9)^2 (15x-18)$$

OR $\underline{3(5x-6)}$

$$y' = 18x(3x-9)^2(5x-6)$$

GCF
 $6x(3x-9)^2$



Examples - Requiring Chain Rule with products and quotients.

$$2) \quad h(x) = 2x\sqrt{3+x^2}$$

$$h(x) = \underline{2x} (\underline{3+x^2})^{1/2}$$

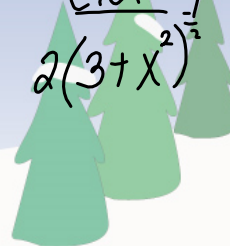
$$h'(x) = 2(3+x^2)^{1/2} + 2x \left(\frac{1}{2} (\underline{3+x^2})^{-1/2} \cdot 2x \right)$$

$$h'(x) = 2(3+x^2)^{1/2} + 2x^2(3+x^2)^{-1/2}$$

$$h'(x) = 2(3+x^2)^{-1/2} (3+x^2+x^2)$$

$$h'(x) = \frac{2(3+2x^2)}{(3+x^2)^{1/2}} = \frac{2(3+2x^2)}{\sqrt{3+x^2}}$$

GCF:
 $2(3+x^2)^{-1/2}$



Examples - Requiring Chain Rule with products and quotients.

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

$$\left(\frac{x}{2} \right)^3 = \frac{x^3}{2^3} = \frac{x^3}{8}$$

$$y' = 4 \left(\frac{4-2x}{3x^2+1} \right)^3 \cdot \left(\frac{-2(3x^2+1) - 6x(4-2x)}{(3x^2+1)^2} \right)$$

$$y' = 4 \frac{(4-2x)^3}{(3x^2+1)^3} \cdot \frac{2(3x^2-12x-1)}{6x^2-24x-2}$$

$$y' = \frac{4(4-2x)^3(6x^2-24x-2)}{(3x^2+1)^5} \quad \text{OR} \quad \frac{8(4-2x)^3(3x^2-12x-1)}{(3x^2+1)^5}$$

Examples - Requiring Chain Rule with products and quotients.

$$4) \quad y = 5t(7t^2 - 3)^4$$

$$y' = 5(7t^2-3)^4 + 5t(4(7t^2-3)^3(14t))$$

$$= 5(7t^2-3)^4 + 280t^2(7t^2-3)^3$$

$$\text{GCF} \quad 5(7t^2-3)^3$$

$$y' = 5(7t^2-3)^3(7t^2-3+56t^2)$$

$$y' = 5(7t^2-3)^3(63t^2-3)$$

OR

$$= 15(7t^2-3)^3(21t^2-1)$$

$$5) \quad f(x) = \frac{x}{\sqrt{2x^2-1}}$$