

Warm-up

Take notes on your own paper.

Differentiate.

$$1. y = \sqrt{x} - \sqrt[3]{x^2} + \frac{3}{x^3} \quad \frac{dy}{dx} = \left(\frac{1}{2}\right)x^{-\frac{1}{2}} - \left(\frac{2}{3}\right)x^{-\frac{1}{3}} + \frac{3}{2x^2}$$

$$2. y = \frac{3x^2 - 4x + 2}{x^2} \quad \frac{dy}{dx} = 4x^{-2} - 4x^{-3}$$

$$3. y = \sin \theta + \theta^2 \quad \frac{dy}{d\theta} = \cos \theta + 2\theta$$

Sep 14-7:15 AM

$$y = \sqrt{x} - \sqrt[3]{x^2} + \frac{3}{x^3}$$

$$y = x^{\frac{1}{2}} - x^{\frac{2}{3}} + 3x^{-3}$$

$$\frac{dy}{dx} = \frac{1}{2}x^{-\frac{1}{2}} - \frac{2}{3}x^{-\frac{1}{3}} - 9x^{-4}$$

Aug 31-10:35 AM

[2.3] The Product and Quotient Rules

Product Rule

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

Quotient Rule

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

↙ high
↘ low

low d[high] minus high d[low]
draw the line and square below

Sep 18-10:02 AM

Ex 1. $h(x) = (3x - 2x^2)(5 + 4x)$



$$h'(x) = (3x - 2x^2)(4) + (3 - 4x)(5 + 4x)$$

Ex 2. $g(x) = x \sin x$

$$g'(x) = (x)(\cos x) + (1)(\sin x)$$

Ex 3. $k(x) = [2x \sin x] - 2 \sin x$

$$k'(x) = (2x)(\cos x) + (2)(\sin x) - 2 \cos x$$

Sep 18-10:03 AM

Ex 4. $f(x) = \frac{5x+2}{2x-1}$



$$f'(x) = \frac{(2x-1)(5) - (5x+2)(2)}{(2x-1)^2}$$

Ex 5. $r(x) = \frac{\cos x}{3-4x}$

$$r'(x) = \frac{(3-4x)(-\sin x) - (\cos x)(-4)}{(3-4x)^2}$$

Sep 18-10:03 AM

Ex 6. $g(x) = \frac{\sin x \cos x}{2x+1}$



$$g'(x) = \frac{(2x+1)[(\sin x)(-\sin x) + (\cos x)(\cos x)] - (\sin x \cos x)(2)}{(2x+1)^2}$$

Ex 7. $f(x) = \frac{\sin x}{\cos x}$

Simplify!

$$f'(x) = \frac{(\cos x)(\cos x) - (\sin x)(-\sin x)}{(\cos x)^2}$$

$$f'(x) = \frac{\cos^2 x + \sin^2 x}{\cos^2 x} = \frac{1}{\cos^2 x} = \sec^2 x$$

$$f(x) = \tan x \longrightarrow f'(x) = \sec^2 x$$

Sep 18-10:03 AM

More Trigonometric Derivatives

$$\frac{d}{dx}[\tan x] = \sec^2 x$$

$$\frac{d}{dx}[\cot x] = -\csc^2 x$$

$$\frac{d}{dx}[\sec x] = \sec x \tan x$$

$$\frac{d}{dx}[\csc x] = -\csc x \cot x$$

Sep 18-10:04 AM

Ex 1. $f(x) = \sin x \cdot \sec x$

$$f(x) = \tan x$$

$$f'(x) = \sec^2 x$$



Ex 2. $f(x) = 3x \tan x$

$$f'(x) = (3x)(\sec^2 x) + (3)(\tan x)$$

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Ex 3. $g(x) = 2x \cos x - \csc x$

$$g'(x) = (2x)(-\sin x) + (2)(\cos x) + \csc x \cot x$$



Ex 4. $g(x) = -x^3 \cot x$

$$g'(x) = (-x^3)(-\csc^2 x) + (-3x^2)(\cot x)$$

Sep 18-10:04 AM

HOMEWORK:

p. 125 #21-54 (mult. 3), 65,
68, 76, 81

Sep 11-3:12 PM