

## Advanced Derivative Rules

### 4.3C – Products, Quotients & Trigonometry II

A: Differentiate using the Product Rule

#1)  $\frac{d}{dx} \left( \frac{1}{3} x^3 \cot(x) \right)$

#2) If  $f(x) = \frac{1}{5} x^5 \sec(x)$ , find  $f'(x)$ .

#3)  $\frac{d}{dx} [x \cos(x)]$

#4) If  $f(x) = (\sin(x) + 1)\tan(x)$ , find  $f'(x)$ .

#5)  $\frac{d}{dx} [x \sin(x) \cos(x) \sec(x) \cot(x)]$

#6) If  $f(x) = \frac{1}{2} \csc(x)$ , find  $f'(x)$ .

#7)  $\frac{d}{dx} \left[ \frac{1}{x} \tan(x) \sin(x) \cot(x) \right]$

#8) Prove that  $\frac{d}{dx} \tan(x) = \sec^2(x)$

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B: Differentiating using the Quotient Rule.

$$\#9) \frac{d}{dx} \left( \frac{\cos(x)}{x^2} \right)$$

$$\#12) \frac{d}{dx} \left( \frac{\sec(x)}{x^2-25} \right)$$

$$\#10) \frac{d}{dx} \left( \frac{6x^4}{\cos(-x)} \right)$$

$$\#13) \frac{d}{dx} \left( \frac{\tan(x)+\sin(x)}{\sqrt{x^3}} \right)$$

$$\#11) \frac{d}{dx} \left( \frac{x}{\csc(x)} \right)$$

$$\#14) \frac{d}{dx} \left( \frac{\cos(x)}{\sin(x)} \right)$$