Section 2.4 - Product and Quotient Rule

Product Rule: $\frac{d}{dx}\left(f(x)g(x)\right) = f'(x)g(x) + f(x)g'(x)$

Quotient Rule: $\frac{d}{dx}\left(\frac{f(x)}{g(x)}\right) = \frac{g(x)f'(x) - f(x)g'(x)}{(g(x))^2}$

Product Rule Examples

Ex) $\frac{d}{dx}(5x^2 \sin x)$. Evaluate at $\frac{\pi}{2}$. Ans: 5π

Ex) Use two ways to find $\frac{d}{dx}\left((x^2+3x+1)(2x^3-3x+1)\right)$

Ex) $\frac{d}{dx}(x^3 \ln(x) \cos(x))$

Ex) $\frac{d}{dx}(x \ln x)$ Ex) $\frac{d}{dx}(x \ln x - x)$

Quotient Rule

Ex) $\frac{d}{dx}\left(\frac{5x^2}{\sin x}\right)$ Ex) $\frac{d}{dx}(\tan(x))$

Ex) $(5x^2 \csc x)'$

Derivatives of Trig Functions

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

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

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