Calculus: Derivative Formulas

Non-Chain-Rule

$$\frac{d}{dx}X^n = n \cdot X^{n-1}$$

$$\frac{d}{dx}\sin x = \cos x$$

$$\frac{d}{dx}\cos x = -\sin x$$

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

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

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

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

Inverse trig functions

$$\frac{d}{dx}(\sin^{-1} u) = \frac{u'}{\sqrt{1-u^2}}$$

$$\frac{d}{dx}(\cos^{-1} u) = \frac{-u'}{\sqrt{1-u^2}}$$

$$\frac{d}{dx}(\tan^{-1} u) = \frac{u'}{1+u^2}$$

$$\frac{d}{dx}(\cot^{-1} u) = \frac{-u'}{1+u^2}$$

$$\frac{d}{dx}(\sec^{-1} u) = \frac{u'}{|u|\sqrt{u^2-1}}$$

$$\frac{d}{dx}(\csc^{-1} u) = \frac{-u'}{|u|\sqrt{u^2-1}}$$

Chain-Rule

$$\frac{d}{dx}u^n = n \cdot u^{n-1} \cdot u'$$

$$\frac{d}{dx}\sin(u) = \cos(u) \cdot u'$$

$$\frac{d}{dx}\cos(u) = -\sin(u) \cdot u'$$

$$\frac{d}{dx}\tan(u) = \sec^2(u) \cdot u'$$

$$\frac{d}{dx}\cot(u) = -\csc^2(u) \cdot u'$$

$$\frac{d}{dx}\sec(u) = \sec(u)\tan(u) \cdot u'$$

$$\frac{d}{dx}\csc(u) = -\csc(u)\cot(u) \cdot u'$$

$$\frac{d}{dx}e^u = e^u \cdot u'$$

$$\frac{d}{dx}\ln u = \frac{1}{u} \cdot u' = \frac{u'}{u}$$

Product and Quotient Rules

$$\frac{d}{dx}(u \cdot v) = u \cdot v' + v \cdot u'$$

$$\frac{d}{dx}\left[\frac{u}{v}\right] = \frac{v \cdot u' - u \cdot v'}{v^2}$$

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