

## Basic Differentiation Rules for Elementary Functions

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$$\frac{d}{dx}[cu] = cu'$$

$$\frac{d}{dx}[u \pm v] = u' \pm v'$$

$$\frac{d}{dx}[uv] = uv' + vu'$$

$$\frac{d}{dx}\left[\frac{u}{v}\right] = \frac{uv' - vu'}{v^2}, v \neq 0$$

$$\frac{d}{dx}[c] = 0$$

$$\frac{d}{dx}[u^n] = nu^{n-1}u'$$

$$\frac{d}{dx}[x] = 1$$

$$\frac{d}{dx}[|u|] = \frac{u}{|u|}(u')$$

$$\frac{d}{dx}[\ln u] = \frac{u'}{u}$$

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

$$\frac{d}{dx}[\log_a u] = \frac{u'}{(\ln a)u}$$

$$\frac{d}{dx}[a^u] = (\ln a)a^u u'$$

$$\frac{d}{dx}[\operatorname{arc csc} u] = \frac{-u'}{|u|\sqrt{u^2 - 1}}$$

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

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

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

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

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

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

$$\frac{d}{dx}[\arcsin u] = \frac{u'}{\sqrt{1 - u^2}}$$

$$\frac{d}{dx}[\arccos u] = \frac{-u'}{\sqrt{1 - u^2}}$$

$$\frac{d}{dx}[\arctan u] = \frac{u'}{1 + u^2}$$

$$\frac{d}{dx}[\operatorname{arc cot} u] = \frac{-u'}{1 + u^2}$$

$$\frac{d}{dx}[\operatorname{arc sec} u] = \frac{u'}{|u|\sqrt{u^2 - 1}}$$