Calculus 1 – Derivatives Formula Sheet:

Basic Derivatives:	$\frac{d}{dx}[\boldsymbol{c}] = 0$ $\quad \frac{d}{dx}[\boldsymbol{x}] = 1$ $\quad \frac{d}{dx}[\boldsymbol{cx}] = c$ $\frac{d}{dx}[\boldsymbol{c * f(x)}] = c * f'(x)$
Trigonometric Derivatives:	$\frac{d}{dx}[\boldsymbol{\sin x}] = \cos x$ $\quad \frac{d}{dx}[\boldsymbol{\cos x}] = -\sin x$ $\frac{d}{dx}[\boldsymbol{\tan x}] = sec^2 x$ $\quad \frac{d}{dx}[\boldsymbol{\cot x}] = -csc^2 x$ $\frac{d}{dx}[\boldsymbol{\sec x}] = \sec x \tan x$ $\quad \frac{d}{dx}[\boldsymbol{\csc x}] = -\csc x \cot x$
The Power Rule:	$\frac{d}{dx}[\boldsymbol{x^n}] = nx^{n-1}$
The Product Rule:	$\frac{d}{dx}[\boldsymbol{uv}] = u'v + uv'$ $\frac{d}{dx}[\boldsymbol{uvw}] = u'vw + uv'w + uvw'$
The Quotient Rule:	$\frac{d}{dx}\left[\frac{\boldsymbol{u}}{\boldsymbol{v}}\right] = \frac{vu' - uv'}{v^2}$
The Reciprocal Rule:	$\frac{d}{dx}\left[\frac{\boldsymbol{1}}{\boldsymbol{u}}\right] = \frac{-u'}{u^2}$

The Chain Rule:	$$\frac{\boldsymbol{dy}}{\boldsymbol{dx}} = \frac{dy}{du} * \frac{du}{dx}$$ $$\frac{d}{dx}[\boldsymbol{f}(\boldsymbol{g}(\boldsymbol{x}))] = f'(g(x)) * g'(x)$$ $$\frac{d}{dx}[\boldsymbol{f}(\boldsymbol{g}(\boldsymbol{u}))] = f'(g(u)) * g'(u) * u'$$ $$\frac{d}{dx}[\boldsymbol{f}(\boldsymbol{x})]^{\boldsymbol{n}} = n[f(x)]^{n-1} * f'(x)$$
Trig Derivatives: **"With Chain Rule"**	$$\frac{d}{dx}\mathbf{sin}(\boldsymbol{u}) = \cos(u)\,u' \qquad \frac{d}{dx}\mathbf{cos}(\boldsymbol{u}) = -\sin(u)\,u'$$ $$\frac{d}{dx}\mathbf{tan}(\boldsymbol{u}) = sec^2(u)\,u' \qquad \frac{d}{dx}\mathbf{cot}(\boldsymbol{u}) = -csc^2(u)\,u'$$ $$\frac{d}{dx}\mathbf{sec}(\boldsymbol{u}) = \sec(u)\tan(u)\,u' \qquad \frac{d}{dx}\mathbf{csc}(\boldsymbol{u}) = -\csc(u)\cot(u)\,u'$$
Inverse Trig Derivatives: **"With Chain Rule"**	$$\frac{d}{dx}[\boldsymbol{sin^{-1}}(\boldsymbol{u})] = \frac{u'}{\sqrt{1-u^2}} \qquad \frac{d}{dx}[\boldsymbol{cos^{-1}}(\boldsymbol{u})] = \frac{-u'}{\sqrt{1-u^2}}$$ $$\frac{d}{dx}[\boldsymbol{tan^{-1}}(\boldsymbol{u})] = \frac{u'}{1+u^2} \qquad \frac{d}{dx}[\boldsymbol{cot^{-1}}(\boldsymbol{u})] = \frac{-u'}{1+u^2}$$ $$\frac{d}{dx}[\boldsymbol{sec^{-1}}(\boldsymbol{u})] = \frac{u'}{\lvert u\rvert\sqrt{u^2-1}} \qquad \frac{d}{dx}[\boldsymbol{csc^{-1}}(\boldsymbol{u})] = \frac{-u'}{\lvert u\rvert\sqrt{u^2-1}}$$
Exponential Derivatives:	$$\frac{d}{dx}[\boldsymbol{e^u}] = e^u * u'$$ $$\frac{d}{dx}[\boldsymbol{a^u}] = a^u * u' * \ln a$$
Derivatives of Logs:	$$\frac{d}{dx}[\mathbf{ln}\,\boldsymbol{u}] = \frac{u'}{u}$$ $$\frac{d}{dx}[\boldsymbol{log_a}(\boldsymbol{u})] = \frac{u'}{u\ln a}$$

Logarithmic Differentiation:	$$\frac{d}{dx}[\boldsymbol{u^v}] = u^v\left[\frac{vu'}{u} + v'\ln(u)\right]$$
Inverse Functions:	$$\frac{d}{dx}[\boldsymbol{f^{-1}(a)}] = \frac{1}{f'(b)} \qquad \boldsymbol{f(b) = a} \quad \boldsymbol{f^{-1}(a) = b}$$ $$\frac{d}{dx}[\boldsymbol{f^{-1}(x)}] = \frac{1}{f'[f^{-1}(x)]}$$
Limit Definition:	$$\boldsymbol{f'(x)} = \lim_{h\to 0}\frac{f(x+h) - f(x)}{h}$$
Alternative Definition:	$$\boldsymbol{f'(a)} = \lim_{x\to a}\frac{f(x) - f(a)}{x - a}$$