TABLE OF DERIVATIVES

FUNCTION	DERIVATIVE
C	0
cx	c
x^a	ax^{a-1} ← Multiply by current power. Add -1 to power.
$\sin x$	$\cos x$
$\cos x$	$-\sin x$
$\tan x$	$(\sec x)^2$
$\sec x$	$\sec x \tan x$
e^x	e^x
$\ln \lvert x \rvert$	$\dfrac{1}{x}$
a^x	$(\ln a)a^x$
$\log_b x$	$\dfrac{1}{(\ln b)x}$
$\sinh x$	$\cosh x$
$\cosh x$	$\sinh x$
$\tanh x$	$(\operatorname{sech} x)^2$
$\arcsin x$	$\dfrac{1}{\sqrt{1-x^2}}$
$\arccos x$	$\dfrac{-1}{\sqrt{1-x^2}}$
$\arctan x$	$\dfrac{1}{x^2+1}$
$\displaystyle\int_a^x f(t)\,dt$	$f(x)$

RULES FOR DERIVATIVES

Rule for addition:

If $h(x) = f(x) + g(x)$ OR $\frac{\mathsf{d}}{\mathsf{d}x}(u+v) = \frac{\mathsf{d}u}{\mathsf{d}x} + \frac{\mathsf{d}v}{\mathsf{d}x}$

Then $h'(x) = f'(x) + g'(x)$

Rule for scalar multiplication:

If $h(x) = af(x)$ OR $\frac{\mathsf{d}}{\mathsf{d}x}(au) = a\frac{\mathsf{d}u}{\mathsf{d}x}$

Then $h'(x) = af'(x)$

Product rule:

If $h(x) = f(x)g(x)$ OR $\frac{\mathsf{d}}{\mathsf{d}x}(uv) = \frac{\mathsf{d}u}{\mathsf{d}x}v + u\frac{\mathsf{d}v}{\mathsf{d}x}$

Then $h'(x) = f'(x)g(x) + f(x)g'(x)$

Quotient rule:

If $h(x) = \frac{f(x)}{g(x)}$ OR $\frac{\mathsf{d}}{\mathsf{d}x}\left(\frac{u}{v}\right) = \frac{\frac{\mathsf{d}u}{\mathsf{d}x}v - u\frac{\mathsf{d}v}{\mathsf{d}x}}{v^2}$

Then $h'(x) = \frac{f'(x)g(x) - f(x)g'(x)}{(g(x))^2}$

Chain rule:

If $h(x) = f(g(x))$ OR $\frac{\mathsf{d}y}{\mathsf{d}x} = \frac{\mathsf{d}y}{\mathsf{d}u}\frac{\mathsf{d}u}{\mathsf{d}x}$

Then $h'(x) = f'(g(x))g'(x)$