Differentiation Formulas

The following table provides the differentiation formulas for common functions. The first six rows correspond to general rules (such as the addition rule or the product rule) whereas the remaining rows contain the formulas for specific functions.

	$F(x)$	$F'(x)$
Addition	$f(x) \pm g(x)$	$f'(x) \pm g'(x)$
Linearity	$af(x)$	$af'(x)$
Product Rule	$f(x)g(x)$	$f'(x)g(x) + f(x)g'(x)$
Quotient Rule	$\frac{f(x)}{g(x)}$	$\frac{f'(x)g(x) - f(x)g'(x)}{(g(x))^2}$
Chain Rule	$f(g(x))$	$f'(g(x)) \cdot g'(x)$
	$f^{-1}(x)$	$\frac{1}{f'(f^{-1}(x))}$
Basic functions	$x^n \qquad$ for any real n	nx^{n-1}
	e^x	e^x
	$a^x \qquad (a > 0)$	$(\ln a)a^x$
	$\ln x$	$\frac{1}{x}$
Trig functions	$\sin x$	$\cos x$
	$\cos x$	$-\sin x$
	$\tan x$	$\frac{1}{\cos^2 x} = 1 + \tan^2 x$
	$\arctan x = \tan^{-1} x$	$\frac{1}{1+x^2}$
	$\arcsin x = \sin^{-1} x$	$\frac{1}{\sqrt{1-x^2}}$
Hyperbolic Trig	$\sinh x$	$\cosh x$
	$\cosh x$	$\sinh x$
	$\tanh x$	$\frac{1}{\cosh^2 x}$
	$\sinh^{-1} x$	$\frac{1}{\sqrt{1+x^2}}$
	$\tanh^{-1} x$	$\frac{1}{1-x^2}$