Basic Differentiation Formulas

In the table below, $u = f(x)$ and $v = g(x)$ represent differentiable functions of x

Derivative of a constant	$\frac{dc}{dx} = 0$	
Derivative of constant multiple	$\frac{d}{dx}(cu) = c\,\frac{du}{dx}$	(We could also write $(cf)' = cf'$, and could use the "prime notion" in the other formulas as well)
Derivative of sum or difference	$\frac{d}{dx}(u \pm v) = \frac{du}{dx} \pm \frac{dv}{dx}$	
Product Rule	$\frac{d}{dx}(uv) = u\,\frac{dv}{dx} + v\,\frac{du}{dx}$	
Quotient Rule	$\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2}$	
Chain Rule	$\frac{dy}{dx} = \frac{dy}{du}\,\frac{du}{dx}$	

	$\frac{d}{dx}x^n = nx^{n-1}$	$\frac{d}{dx}u^n = nu^{n-1}\,\frac{du}{dx}$
	$\frac{d}{dx}a^x = (\ln a)\,a^x$	$\frac{d}{dx}a^u = (\ln a)\,a^u\,\frac{du}{dx}$
(If $a = e$)	$\frac{d}{dx}e^x = e^x$	$\frac{d}{dx}e^u = e^u\,\frac{du}{dx}$
	$\frac{d}{dx}\log_a x = \frac{1}{(\ln a)\,x}$	$\frac{d}{dx}\log_a u = \frac{1}{(\ln a)\,u}\,\frac{du}{dx}$
(If $a = e$)	$\frac{d}{dx}\ln x = \frac{1}{x}$	$\frac{d}{dx}\ln u = \frac{1}{u}\,\frac{du}{dx}$
	$\frac{d}{dx}\sin x = \cos x$	$\frac{d}{dx}\sin u = \cos u\,\frac{du}{dx}$
	$\frac{d}{dx}\cos x = -\sin x$	$\frac{d}{dx}\cos u = -\sin u\,\frac{du}{dx}$
	$\frac{d}{dx}\tan x = \sec^2 x$	$\frac{d}{dx}\tan u = \sec^2 u\,\frac{du}{dx}$
	$\frac{d}{dx}\cot x = -\csc^2 x$	$\frac{d}{dx}\cot u = -\csc^2 u\,\frac{du}{dx}$
	$\frac{d}{dx}\sec x = \sec x\tan x$	$\frac{d}{dx}\sec u = \sec u\tan u\,\frac{du}{dx}$
	$\frac{d}{dx}\csc x = -\csc x\cot x$	$\frac{d}{dx}\csc u = -\csc u\cot u\,\frac{du}{dx}$
	$\frac{d}{dx}\sin^{-1} x =$	$\frac{d}{dx}\sin^{-1} u =$
	$\frac{d}{dx}\arcsin x = \frac{1}{\sqrt{1-x^2}}$	$\frac{d}{dx}\arcsin u = \frac{1}{\sqrt{1-u^2}}\,\frac{du}{dx}$
	$\frac{d}{dx}\tan^{-1} x =$	$\frac{d}{dx}\tan^{-1} u =$
	$\frac{d}{dx}\arctan x = \frac{1}{1+x^2}$	$\frac{d}{dx}\arctan u = \frac{1}{1+u^2}\,\frac{du}{dx}$