Trig Identities and Derivatives

Rob Bayer, Math 1B, Summer 2008

There are a lot more identities here than you probably need to know by memory, and there may be some missing from here that would be good to know, but hopefully this will be helpful. FYI: For the most part, you won't be using much of csc or cot, but I've included them here anyways just in case.

Identities

The Basics:	$\sin^2 x + \cos^2 x = 1$	$\tan x = \sin x / \cos x$
	$\sec x = 1/\cos x$	$\sec^2 x = 1 + \tan^2 x$
	$\csc x = 1/\sin x$	$\csc^2 x = 1 + \cot^2 x$
	$\sin(-x) = -\sin(x)$	$\cos(-x) = \cos(x)$
Product Rules:	$\sin A \cos B = \frac{1}{2}(\sin(A-B) + \sin(A+B))$	
	$\sin A \sin B = \frac{1}{2}(\cos(A-B) - \cos(A+B))$	
	$\cos A \cos B = \frac{1}{2}(\cos(A-B) + \cos(A+B))$	
Double/Half Angle:	$\sin x \cos x = \frac{1}{2}\sin(2x)$	$\sin(2x) = 2\sin(x)\cos(x)$
	$\sin^2 x = \frac{1}{2}(1 - \cos(2x))$	$\cos(2x) = 1 - 2\sin^2(x)$
	$\cos^2 x = \frac{1}{2}(1 + \cos(2x))$	$\cos(2x) = 2\cos^2(x) - 1$
	$\tan(2x) = \frac{2\tan(x)}{1-\tan^2(x)}$	$\cos(2x) = \cos^2(x) - \sin^2(x)$

Note that the double/half angle formulas are just the Product Rule ones, with $A = B = x$ plugged in.

Derivatives

$\frac{d}{dx}\sin x = \cos x$	$\frac{d}{dx}\cos x = -\sin x$	$\frac{d}{dx}\tan x = \sec^2 x$
$\frac{d}{dx}\csc x = -\csc x \cot x$	$\frac{d}{dx}\sec x = \sec x \tan x$	$\frac{d}{dx}\cot x = -\csc^2 x$
$\frac{d}{dx}\sin^{-1} x = \frac{1}{\sqrt{1-x^2}}$	$\frac{d}{dx}\cos^{-1} x = -\frac{1}{\sqrt{1-x^2}}$	$\frac{d}{dx}\tan^{-1} x = \frac{1}{1+x^2}$