Derivative of secant

For example, let's use our formula for taking the derivative of $1/v$ to take the derivative of the secant function.

$$\frac{d}{dx}\sec x = \frac{d}{dx}\frac{1}{\cos x} = \frac{d}{dx}(\cos x)^{-1} = -(\cos x)^{-2}(-\sin x)$$

This is usually written in a different fashion; there are often many different ways of writing combinations of trigonometric functions. The standard way of writing this is:

$$\frac{d}{dx}\sec x = -(\cos x)^{-2}(-\sin x) = \frac{\sin x}{\cos^2 x} = \frac{1}{\cos x}\cdot\frac{\sin x}{\cos x} = \sec x \tan x.$$

This is the preferred form which uses the secant and tangent functions to avoid fractions and negative exponents. As you practice calculus with trigonometric functions you'll need to be aware of equivalent ways of describing the same result.

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