METHODS FOR TRIG INTEGRALS

Theorem (Pythagorean identities)**.**

$$\sin^2 x + \cos^2 x = 1$$
$$\tan^2 x + 1 = \sec^2 x$$
$$1 + \cot^2 x = \csc^2 x$$

Theorem (Half-angle formulas)**.**

$$\sin^2 x = \frac{1 - \cos 2x}{2}$$
$$\cos^2 x = \frac{1 + \cos 2x}{2}$$

$\int \sin^m x \cos^n x \; dx$	**Strategy**
If n is odd and positive ...	... keep $\cos x \; dx$, rewrite everything else in terms of $\sin x$, then sub in $u = \sin x$ (with $du = \cos x \; dx$)
If m is odd and positive ...	... keep $\sin x \; dx$, rewrite everything else in terms of $\cos x$, then sub in $u = \cos x$ (with $(-1)du = \sin x \; dx$)
If m and n are both even non-negative integers ...	... use half-angle formulas to convert to $\cos 2x$ and refer back to this table

$\int \tan^m x \sec^n x \; dx$	**Strategy**
If n is even ...	... keep $\sec^2 x \; dx$, rewrite everything else in terms of $\tan x$, then sub in $u = \tan x$ (with $du = \sec^2 x \; dx$)
If m is odd ...	... keep $\tan x \sec x \; dx$, rewrite everything else in terms of $\sec x$, then sub in $u = \sec x$ (with $du = \tan x \sec x \; dx$)
If m is even and n is odd ...	... rewrite everything in terms of $\sec x$ and apply the reduction formula below
If you want ...	... convert to $\sin x$ and $\cos x$ and see the other table

Theorem (Reduction formula)**.** $\int sec^n x \; dx = \frac{\sec^{n-2} x \tan x}{n-1} + \frac{n-2}{n-1} \int \sec^{n-2} x \; dx$ *(provided* $n \neq 1$*).*

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