TRIG INTEGRALS

$\int \sin^m x \cos^n x \; dx$	**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

Theorem (Pythagoras)**.** $\boxed{\sin^2 x + \cos^2 x = 1}$

Note that dividing by $\cos^2 x$ or by $\sin^2 x$ in the Pythagorean theorem also gives useful identities.

Theorem (Half-angle formulas)**.** $\boxed{\sin^2 x = \dfrac{1 - \cos 2x}{2}}$ *and* $\boxed{\cos^2 x = \dfrac{1 + \cos 2x}{2}}$

1. Evaluate the following integrals. (Use scratch paper).

a) $\displaystyle\int \sin^3 x \; dx$

b) $\displaystyle\int \sin^2 x \cos^3 x \; dx$

c) $\displaystyle\int \cos^4 x \; dx$

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

2. Evaluate the following integrals. (Use scratch paper).

a) $\int \sec^4 x \; dx$

b) $\int \tan x \sec^4 x \; dx$

c) $\int \tan^3 x \; dx$