Recall: Pythagorean Identities

$\sin^2 x + \cos^2 x = 1$

Double Angle (Reduction) Formulas

$\sin 2x =$

$\cos 2x =$

ex. $\int \cos^3 x \, dx$

ex. $\int_0^\pi \sin^2 x \, dx$

ex. $\int_{\pi/2}^{3\pi/4} \sin^5 x \cos^3 x \, dx$

ex. $\int_0^{\pi/2} \sin^2 x \cos^2 x \, dx$

Compare and Contrast:

ex. $\int \sec^3 x \tan x \, dx$

ex. $\int \tan^3 x \sec x \, dx$

ex. $\displaystyle\int \frac{dx}{x^2\sqrt{1-x^2}}$

ex. $\int \dfrac{dx}{x^2\sqrt{4-x^2}}$

Guide to know which trigonometric function to use for integrating ~ look at format under radical:

$$\text{not} \int \cos^5 x \sin^3 x \, dx$$

Given: Use:

$\sqrt{a^2-x^2}$ $x = a\sin\theta \longrightarrow dx = a\cos\theta\,d\theta$

$\sqrt{a^2+x^2}$ $x = a\tan\theta \longrightarrow dx = a\sec^2\theta\,d\theta$

$\sqrt{x^2-a^2}$ $x = a\sec\theta \longrightarrow dx = a\sec\theta\tan\theta\,d\theta$