Math 132 - September 30, 2016

$\sin^2 x + \cos^2 = 1$	$\sec^2 x = 1 + \tan^2 x$
$\sin^2 x = \frac{1}{2}(1 - \cos 2x)$	$\cos^2 x = \frac{1}{2}(1 + \cos 2x)$
$\sin A \cos B = \frac{1}{2}\left[\sin(A - B) + \sin(A + B)\right]$	$\sin A \sin B = \frac{1}{2}\left[\cos(A - B) - \cos(A + B)\right]$
$\cos A \cos B = \frac{1}{2}\left[\cos(A - B) + \cos(A + B)\right]$	
$\int \csc x \, dx = -\ln\lvert \csc x + \cot x\rvert + C$	$\int \sec x \, dx = \ln\lvert \sec x + \tan x\rvert + C$

Warm-up Problems

1. Compute the integrals

   (a) Use integration by parts. Let $u = \sec x$.
   $$\int \sec^3 x \, dx$$

   (b) $$\int \sec^4 x \, dx$$

   (c) $$\int \tan^4 x \, dx$$

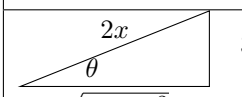
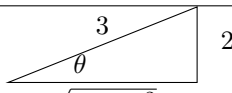
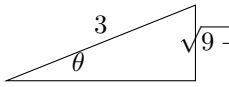
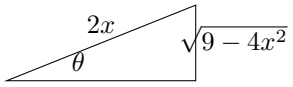
Class Problems

Expression	Substitution	Identity
$\sqrt{a^2 - x^2}$	$x = a\sin\theta$	$1 - \sin^2\theta = \cos^2\theta$
$\sqrt{a^2 + x^2}$	$x = a\tan\theta$	$1 + \tan^2\theta = \sec^2\theta$
$\sqrt{x^2 - a^2}$	$x = a\sec\theta$	$\sec^2\theta - 1 = \tan^2\theta$

2. Integrate $\displaystyle\int \frac{\sqrt{9-4x^2}}{x}\,dx$

   (a) **Clicker** Using the chart, determine the best substitution
   A. $x = 3\sin\theta$ B. $x = \frac{3}{2}\sin\theta$ C. $x = 3\sec\theta$ D. $x = \frac{3}{2}\sec\theta$ E. $x = 3\tan\theta$

   (b) **Clicker** Draw the triangle associated to your substitution.

A.	**B.**	**C.**	**D.**
			

   (c) Using your triangle, find the following.
   i. $\sin\theta =$
   ii. $\cos\theta =$
   iii. $\tan\theta =$
   iv. $\csc\theta =$
   v. $\sec\theta =$
   vi. $\cot\theta =$

   (d) Compute the integral

3. More trig substitution practice:

   (a) $\displaystyle\int \frac{dx}{(x^2+9)^{3/2}} =$

   (b) $\displaystyle\int \frac{\sqrt{25x^2-4}}{x}\,dx =$

   (c) $\displaystyle\int_{2/5}^{4/5} \frac{\sqrt{25x^2-4}}{x}\,dx =$