Trig Identities & Equations
Unit 11.2 – Verifying Trig IDs

<u>Suggestions for Verifying Trig Identities:</u>
Transform the more complicated side of the equation into the form of the simpler side.

Substitute one or more basic trig identities to simplify the expression.

Factor or multiply to simplify the expression.

Multiply both the numerator and denominator by the same trig expression.

Ex A: Find a numerical value of one trig function of each x.

#1) $\sin x = \tan x$

$\frac{\cos x}{\sin x}\sin x = \frac{\sin x}{\cos x}\cdot\frac{\cos x}{\sin x}$

$\cos x = 1$

You are finished when you have one trig function on the left and a number on the right.

#2) $2\tan x = \cot x$

$2\tan x = \frac{1}{\tan x}$

$2\tan^2 x = 1$

$\tan^2 x = \frac{1}{2}$

$\tan x = \pm\sqrt{\frac{1}{2}}$

$\tan x = \pm\frac{1}{\sqrt{2}}$

$\tan x = \pm\frac{\sqrt{2}}{2}$

#3) $\frac{\sin x \cdot \sec x}{\cot x} = \frac{9}{16}$

$\frac{\sin x \frac{1}{\cos x}}{\frac{\cos x}{\sin x}} = \frac{9}{16}$

$\frac{\frac{\sin x}{\cos x}}{\frac{\cos x}{\sin x}} = \frac{9}{16}$

$\frac{\sin^2 x}{\cos^2 x} = \frac{9}{16}$

$\tan^2 x = \frac{9}{16}$

$\tan x = \pm\frac{3}{4}$

Ex B: Verify that each of the following is an identity.

#1) $\tan^2 x \cos^2 x = 1 - \cos^2 x$

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

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

$\frac{\sin^2 x}{\cos^2 x}\cos^2 x = \sin^2 x$

$\sin^2 x = \sin^2 x$

#2) $\csc A \sec A = \cot A + \tan A$

$= \frac{\cos A}{\sin A} + \frac{\sin A}{\cos A}$

$= \frac{\cos^2 A}{\sin A\cos A} + \frac{\sin^2 A}{\sin A\cos A}$ (Common Denom)

$= \frac{\sin^2 A + \cos^2 A}{\sin A\cos A}$

$= \frac{1}{\sin A\cos A}$

$= \frac{1}{\sin A}\cdot\frac{1}{\cos A}$

$\csc A \sec A = \csc A \cdot \sec A$

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#3) $\frac{1+\tan^2\beta}{\csc^2\beta} = \tan^2\beta$

$\frac{\sec^2\beta}{\csc^2\beta} =$

$\frac{\sec^2\beta}{1} \cdot \frac{1}{\csc^2\beta} =$

$\frac{1}{\cos^2\beta} \cdot \frac{\sin^2\beta}{1} =$

$\frac{\sin^2\beta}{\cos^2\beta} =$

$\tan^2\beta = \tan^2\beta$

#4) $\frac{\cos\varphi}{\cos\varphi}\frac{\sec\varphi}{\sin\varphi} - \frac{\sin\varphi}{\cos\varphi}\frac{\sin\varphi}{\sin\varphi} = \cot\varphi$

$\frac{\sec\varphi\cos\varphi}{\sin\varphi\cos\varphi} - \frac{\sin^2\varphi}{\sin\varphi\cos\varphi} =$

$\frac{\sec\varphi\cos\varphi - \sin^2\varphi}{\sin\varphi\cos\varphi} =$

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

$\frac{\cos^2\varphi}{\sin\varphi\cos\varphi} =$

$\frac{\cos\varphi}{\sin\varphi} =$

$\cot\varphi = \cot\varphi$

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

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

#5) $\sin\theta \sec\theta \cot\theta = 1$

$\sin\theta \cdot \frac{1}{\cos\theta} \frac{\cos\theta}{\sin\theta} =$

$1 = 1$

#6) $\sec^2 y - \tan^2 y = \tan y \cot y$

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

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

$\frac{\cos^2 y}{\cos^2 y} =$

$1 = 1$

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http://is.gd/Nu2Notespart2