L4 – 4.5 Prove Trig Identities

MHF4U

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Using your sheet of all identities learned this unit, prove each of the following:

Example 1: Prove $\frac{\sin(2x)}{1+\cos(2x)} = \tan x$

LS

$= \frac{\sin(2x)}{1+\cos(2x)}$

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

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

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

RS

$= \tan x$

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

LS = RS

Example 2: Prove $\cos\left(\frac{\pi}{2} + x\right) = -\sin x$

LS

$= \cos(\pi/2 + x)$

$= \cos(\pi/2)\cos x - \sin(\pi/2)\sin x$

$= 0(\cos x) - 1\sin x$

$= -\sin x$

RS

$= -\sin x$

LS = RS

Example 3: Prove $\csc(2x) = \frac{\csc x}{2\cos x}$

LS

$= \csc(2x)$

$= \frac{1}{\sin(2x)}$

$= \frac{1}{2\sin x \cos x}$

RS

$= \frac{\csc x}{2\cos x}$

$= \csc x \cdot \frac{1}{2\cos x}$

$= \frac{1}{\sin x} \cdot \frac{1}{2\cos x}$

$= \frac{1}{2\sin x \cos x}$

LS = RS

Example 4: Prove $\cos x = \frac{1}{\cos x} - \sin x \tan x$

LS

$= \cos x$

RS

$= \frac{1}{\cos x} - \sin x \tan x$ QI

$= \frac{1}{\cos x} - \sin x \left(\frac{\sin x}{\cos x}\right)$

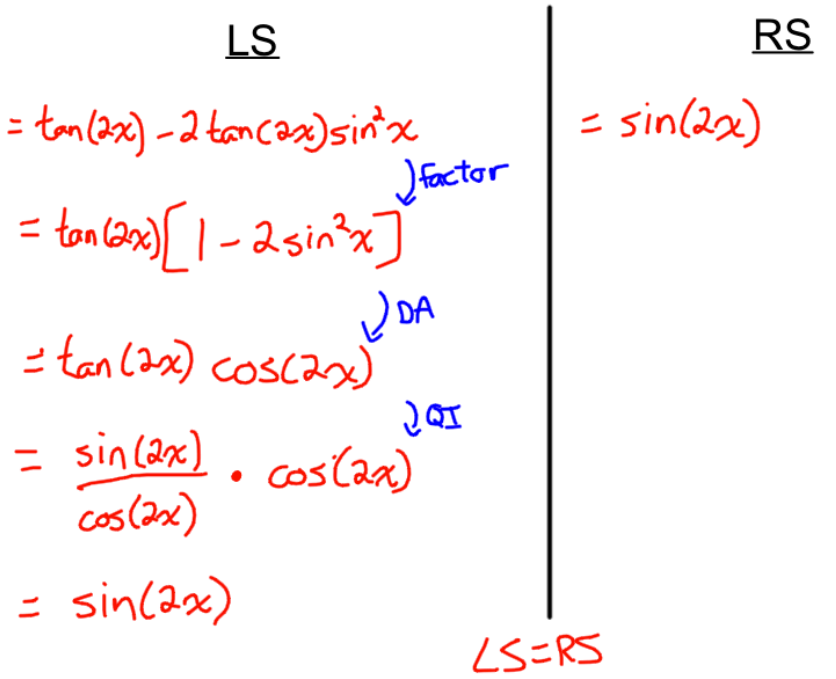
$= \frac{1}{\cos x} - \frac{\sin^2 x}{\cos x}$ PI

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

$= \cos x$

LS = RS

Example 5: Prove $\tan(2x) - 2\tan(2x)\sin^2 x = \sin 2x$



Example 6: Prove $\frac{\cos(x-y)}{\cos(x+y)} = \frac{1+\tan x \tan y}{1-\tan x \tan y}$