

## 4.6 Trigonometric Identities part 2

**DO IT NOW!**

Prove:  $\sin \theta \sec \theta \cot \theta = 1$

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## The Fundamental Trig Identities

Fundamental Trigonometric Identities		
Reciprocal Identities	Quotient Identities	Pythagorean Identities
$\csc \theta = \frac{1}{\sin \theta}$ $\sec \theta = \frac{1}{\cos \theta}$ $\cot \theta = \frac{1}{\tan \theta}$	$\frac{\sin \theta}{\cos \theta} = \tan \theta$	$\sin^2 \theta + \cos^2 \theta = 1$

## Tips for Proving Complex Identities

Tips and Tricks		
Reciprocal Identities	Quotient Identities	Pythagorean Identities
Square both sides $\csc^2 \theta = \frac{1}{\sin^2 \theta}$ $\sec^2 \theta = \frac{1}{\cos^2 \theta}$ $\cot^2 \theta = \frac{1}{\tan^2 \theta}$	Square both sides $\frac{\sin^2 \theta}{\cos^2 \theta} = \tan^2 \theta$	Rearrange the identity $\sin^2 \theta = 1 - \cos^2 \theta$ $\cos^2 \theta = 1 - \sin^2 \theta$

### General tips for proving identities:

- i) Try to change everything to  $\sin \theta$  or  $\cos \theta$
- ii) If you have to fractions being added or subtracted, find a common denominator and combine the fractions
- iii) Use difference of squares  $\rightarrow 1 - \sin^2 \theta = (1 - \sin \theta)(1 + \sin \theta)$
- iv) Use the power rule  $\rightarrow \sin^6 \theta = (\sin^2 \theta)^3$

**Example 1:**

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

**Example 2:**

Prove that  $\frac{1}{1 - \sin x} - \frac{1}{1 + \sin x} = \frac{2 \tan x}{\cos x}$

**Example 3:**

Prove that  $(\sin \theta + \cos \theta)^2 + (\sin \theta - \cos \theta)^2 = 2$

**Example 4:**

Prove that  $\tan x + \frac{\cos x}{1 + \sin x} = \sec x$