

4.6 Trigonometric Identities part 1

Identity: an equation that is always true, regardless of the value of the variable.

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:

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

Example 1: Prove that $\frac{\cos \theta \tan \theta}{\sin \theta} = 1$

L.S.

R.S.

Example 2: Prove that $\tan^2\theta + 1 = \sec^2\theta$

L.S.

R.S.

Example 3: Prove that $\cos^2 x = (1 - \sin x)(1 + \sin x)$

L.S.

R.S.

Example 4: Prove that $1 - \cos^2\theta = \sin\theta \cos\theta \tan\theta$

L.S.

R.S.

Example 5: Prove that $\sin^6\theta = (1 - \cos^2\theta)^3$

L.S.

R.S.

Example 6:

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

L.S.



R.S.