

# Solving Trigonometric Proofs Cheat Sheet by lwaites via cheatography.com/125223/cs/28413/

### Solving Trigonometric Proofs

#### Method 1

Pick one side of the equation (usually the most complicated side) and work with that side until it is equal to the other side

#### Method 2

Work with both sides simultaneously until they are both equal to the same expression.

# Helpful Techniques

#### Rewrite

Rewrite the expression in terms of sine and cosine only

#### Multiply by One

Multiply the numerator and denominator of a rational expression by a carefully chosen "one"

#### Combine fractions

Write sums and differences of rational expressions as a single fraction

#### Factor

Factor trigonometric expressions, using "u-substitution" as needed

#### Pythagorean Theorem

Look for combinations or portions of Pythagorean Identities. Remember that you can multiply, divide, add or subtract the identity to get a new version.

# Goal

Always keep the goal in mind. As you manipulate one side of the equation, keep the other side in mind. Look for commonalities

# Verifying Trigonometric Identities

Video: http://youtu.be/Rf05H8ogHLg

# Pythagorean Identities

$$\sin^2 x + \cos^2 x = 1$$
  
 $\sin^2 x = 1 - \cos^2 x$   
 $\cos^2 x = 1 - \sin^2 x$   
 $1 + \cot^2 x = \csc^2 x$   
 $\cot^2 x = \csc^2 x - 1$   
 $\tan^2 x + 1 = \sec^2 x$   
 $\tan^2 x = \sec^2 x - 1$ 

Divide original Pythagorean identity by  $\sin^2 x$  or  $\cos^2 x$  to get other identities, subtract to get even more.

# **Basic Trigonometric Functions**

sin(-x) = -sin(x)	tan(x) = sin(x) / cos(x)	csc(x) = 1/sin(x)
cos(-x) = cos(x)	$\cot(x) = \cos(x) / \sin(x)$	sec(x) = 1/cos(x)
tan (-x) = -tan (x)		$\cot(x) = 1/\tan(x)$

## **Complementary Angle Identities**

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

## Sum and Difference Identities

sin (a +/- b) =	sin (a) cos (b) +/- cos (a) sin (b)
cos (a +/- b) =	cos (a) cos (b) -/+ sin (a) sin (b)

Use sin (a +/- b) / cos (a +/- b) to find tan (a +/- b)

## **Double Angle Identities**

sin (2x)	cos (2x)	
2 sin (x) cos (x)	$\cos^2(x) - \sin^2(x)$	
	$1 - 2 \sin^2(x)$	
	$2\cos^2(x) - 1$	



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