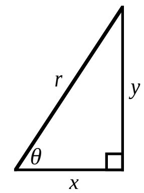
Math 130 Verifying Trigonometric Identities

Definitions:

$\sin\theta = \frac{y}{r}$ $\cos\theta = \frac{x}{r}$ $\tan\theta = \frac{y}{x}$ $\cot\theta = \frac{x}{y}$ $\csc\theta = \frac{r}{y}$ $\sec\theta = \frac{r}{x}$



Reciprocal identities:

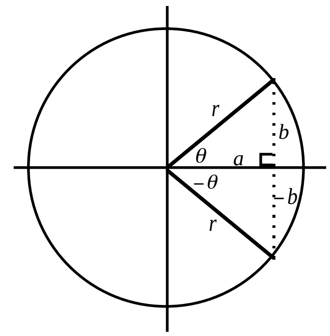
$\csc\theta = \dfrac{1}{\sin\theta}$, $\sec\theta = \dfrac{1}{\cos\theta}$, $\cot\theta = \dfrac{1}{\tan\theta}$

Co-function Identities:

$\sin\theta = \cos(\frac{\pi}{2} - \theta)$, $\cos\theta = \sin(\frac{\pi}{2} - \theta)$

Negative angle identities:

$\sin(-\theta) = -\sin\theta, \cos(-\theta) = \cos\theta, \tan(-\theta) = -\tan\theta$



Identities:

1) $\tan x = \dfrac{\sin x}{\cos x} \rightarrow \cot x = \dfrac{\cos x}{\sin x}$

2) $\sin^2 x + \cos^2 x = 1 \rightarrow \tan^2 x + 1 = \sec^2 x$, $1 + \cot^2 x = \csc^2 x$

TO DO

- Start with more complex side (more to work with)
- Always look for forms of known identities that you can apply (e.g. $1 - \sin^2 x = \cos^2 x$)
- Multiply denominators according to table below:

Denominator	Multiply by
$1 \pm \sin x$	$\dfrac{1 \mp \sin x}{1 \mp \sin x}$
$1 \pm \cos x$	$\dfrac{1 \mp \cos x}{1 \mp \cos x}$
$\sec x \pm \tan x$	$\dfrac{\sec x \mp \tan x}{\sec x \mp \tan x}$
$\sec x \pm 1$	$\dfrac{\sec x \mp 1}{\sec x \mp 1}$
$\csc x \pm \cot x$	$\dfrac{\csc x \mp \cot x}{\csc x \mp \cot x}$
$\csc x \pm 1$	$\dfrac{\csc x \mp 1}{\csc x \mp 1}$

- Multiply denominators of by
- Convert $\tan x, \cot x, \csc x, \sec x \rightarrow \sin x, \cos x$ expressions then algebra, typically clearing fractions.

Multiply by conjugate *only* if it gets you a form equivalent to one of the Pythag. identities.
Otherwise convert to $\sin x, \cos x$.