Period 4, Jan 16, 2025

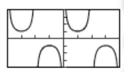
Use properties of natural logarithms and fundamental trigonometric identities to show that the pair of expressions is equivalent.

$\ln|\tan x| + \ln|\cos x|$ and $\ln|\sin x|$

on Board

In the following exercise, half of an identity and the graph of this half are given. Use the graph to make a conjecture as to what the right side of the identity should be. Then prove your conjecture.

$$\frac{(\csc x + \cot x)(\csc x - \cot x)}{\sin x} = ?$$

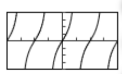


$[-2\pi, 2\pi, \pi/2]$ by $[-4, 4, 1]$

on Board

In the following exercise, half of an identity and the graph of this half are given. Use the graph to make a conjecture as to what the right side of the identity should be. Then prove your conjecture.

$$\frac{1}{\sec x - \tan x} - \frac{1}{\sec x + \tan x} = ?$$



$[-2\pi, 2\pi, \pi/2]$ by $[-4, 4, 1]$

on Board

Verify the identity. $\dfrac{\cos x - \sin x - 1}{\cos x + \sin x + 1} = \dfrac{\cos x - 1}{\sin x}$

on Board

Verify the identity.

$$\csc t \cot t = \frac{1 + \cot^2 t}{\sec t}$$

Verify the identity.

$$\frac{\sin\theta + \cos\theta}{\sin\theta} + \frac{\cos\theta + \sin\theta}{\cos\theta} = 2 + \sec\theta \csc\theta$$

Use properties of natural logarithms and fundamental trigonometric identities to show that the pair of expressions is equivalent.

$\ln|1 + \cos\theta| - 2\ln|\sin\theta|$ and $-\ln|1 - \cos\theta|$

Verify the identity.

$$\frac{\mathbf{csc}\,(2\theta) - \mathbf{sin}\,(2\theta)}{\mathbf{cos}\,(2\theta)} = \mathbf{cot}\,(2\theta)$$

Verify the identity.

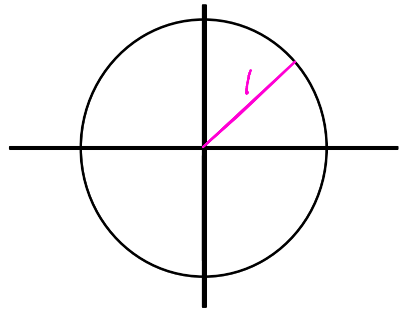
$$\mathbf{sec}^2 x\,\mathbf{csc}^2 x = \mathbf{sec}^2 x + \mathbf{csc}^2 x$$

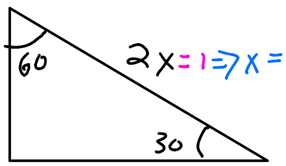
Verify the identity.

$$\frac{\mathbf{csc}\ \theta\,\mathbf{sin}\ \theta}{\mathbf{cot}\ \theta} = \mathbf{tan}\ \theta$$

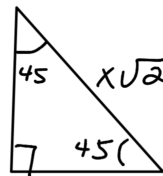
unit circle

radius = 1





$\frac{1}{2}\cdot\frac{\sqrt{3}}{1} = \frac{\sqrt{3}}{2}$



$\frac{x\sqrt{2}}{\sqrt{2}} = \frac{1}{\sqrt{2}} = \frac{1\sqrt{2}}{\sqrt{2}\sqrt{2}}$

$x = \frac{\sqrt{2}}{2}$

$8\cdot\frac{\pi}{12} = \frac{4\cdot 2\cdot \pi}{4\cdot 3}$

$4\cdot\frac{\pi}{12} = \frac{\cancel{4}\pi}{3\cdot\cancel{4}}$

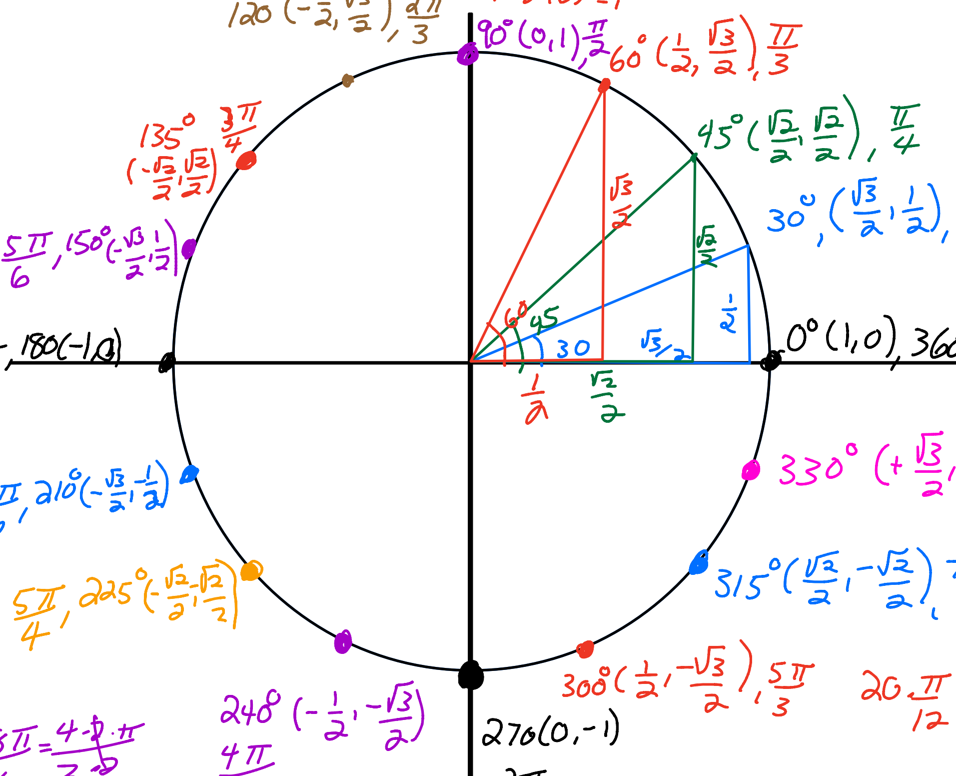
$\frac{\pi}{12} \approx 15^\circ$

$2\cdot\frac{\pi}{12} = \frac{\pi}{6}$ 30°

$150^\circ \approx 10\cdot\frac{\pi}{12}$

$150^\circ \approx \frac{5\pi}{6}$

unit circle
radius = 1



$14\cdot\frac{\pi}{12}$

$\frac{8\pi}{6} = \frac{4\cdot\cancel{2}\cdot\pi}{3\cdot\cancel{2}}$

$20\cdot\frac{\pi}{12}$