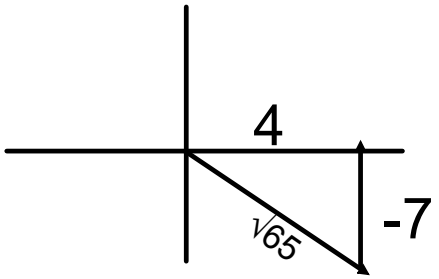
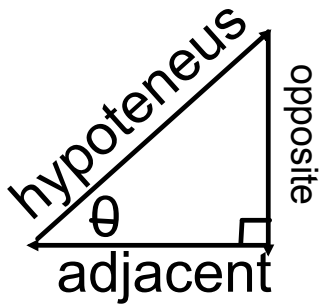
Finding values of trigonometric functions given information about an angle: Problem type 1

Let $(4, -7)$ be a point on the terminal side of θ.

Find the exact values of $\sin\theta$, $\sec\theta$, and $\tan\theta$.





$$\text{soh} = \frac{\text{opp}}{\text{hyp}} = \frac{-7}{\sqrt{65}}$$

$4^2+7^2=h^2$

$16+49=65=h^2$

$\sec x = 1/\cos x = \text{hyp/adj}$

$\sqrt{65} / 4$

Values of inverse trigonometric functions

Find the exact value of $\tan^{-1}\left(-\frac{\sqrt{3}}{3}\right)$. $= \theta$

x	tan x
0	0
45°	1
90°	und.

x	$\tan^{-1}$
0	0°
1	45°

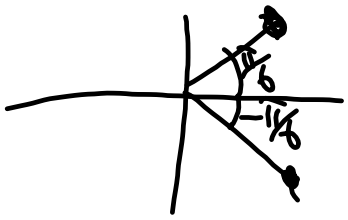
Write your answer in radians in terms of π.

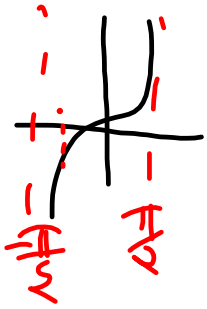
$-30^\circ \cdot \frac{\pi}{180} = -\frac{\pi}{6}$

$\tan\theta = -\frac{\sqrt{3}}{3}$

	0	π/6	π/4	π/3	π/2
sin	0	√1/2	√2/2	√3/2	√4/2
cos	1	√3/2	√2/2	1/2	0
tan	0	1/√3	1	√3	U

$\tan\frac{\pi}{6} = \frac{\sqrt{3}}{3}$





Simplifying trigonometric expressions

Simplify.

$\tan x \csc x$ Convert to sinx, cosx

Use algebra and the fundamental trigonometric identities.
Your answer should be a number or use a single trigonometric function.

$\tan x = \frac{\sin x}{\cos x}$

$\csc x = \frac{1}{\sin x}$

$\tan x \csc x = \frac{\sin x}{\cos x} \cdot \frac{1}{\sin x} = \frac{1}{\cos x} = \sec x$

Equations have equal signs

3 possibilities:

age = 45 True on the Condition

age = age + 1 Never! Contradiction

age = age Always! Identity

tanx = sinx / cosx

1= cot x * tan x

Reciprocal identities:

$$\sin u = \frac{1}{\csc u} \qquad \cos u = \frac{1}{\sec u} \qquad \tan u = \frac{1}{\cot u}$$

$$\csc u = \frac{1}{\sin u} \qquad \sec u = \frac{1}{\cos u} \qquad \cot u = \frac{1}{\tan u}$$

Quotient identities:

$$\tan u = \frac{\sin u}{\cos u} \qquad \cot u = \frac{\cos u}{\sin u}$$

Pythagorean identities:

$$\sin^2 u + \cos^2 u = 1$$

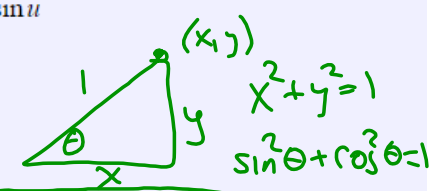
$$\tan^2 u + 1 = \sec^2 u$$

$$\cot^2 u + 1 = \csc^2 u$$

know they exist

$\div \cos^2 u \rightarrow \tan^2 u + 1 = \sec^2 u$

$\div \sin^2 u \rightarrow 1 + \cot^2 u = \csc^2 u$



$x^2 + y^2 = 1$

$\sin^2\theta + \cos^2\theta = 1$

NOTATION

$(\sin\theta)^2 = \sin^2\theta$

$\sin(\theta^2) \neq \sin\theta^2$

Statement
$(1 + \cot^2 x)\tan x$
$= (\csc^2 x)\tan x$
$= \left(\frac{1}{\sin^2 x}\right)\tan x$
$= \left(\frac{1}{\sin^2 x}\right)\left(\frac{\sin x}{\cos x}\right)$
$= \left(\frac{1}{\sin x}\right)\left(\frac{1}{\cos x}\right)$
$= \csc x \sec x$

$1+\cot^2 x = \csc^2 x$ Pythagorean Id.

$\csc^2 x = \frac{1}{\sin^2 x}$ Reciprocal

$\tan x = \frac{\sin x}{\cos x}$ Quotient

Algebra

Reciprocals.

Day 19 - Question #4;
Verifying a trigonometric identity

Complete the proof of the identity by choosing the Rule that justifies each step.

$$(1 - \cos^2 x)\sec x = \sin x \tan x$$

Statement	Rule
$(1 - \cos^2 x)\sec x$	
$= \sin^2 x \sec x$	Pythagorean
$= \sin^2 x \left(\frac{1}{\cos x}\right)$	Reciprocal
$= \sin x \left(\frac{\sin x}{\cos x}\right)$	Algebra
$= \sin x \tan x$	Quotient

Prove the identity.

$$\cot x\left(\sec^2 x - 1\right) = \tan x$$

Statement	Rule
$\cot x\left(\sec^2 x - 1\right)$	
$= \cot x\left(\tan^2 x\right)$	Pythagorean
$= \left(\frac{1}{\tan x}\right)\left(\tan^2 x\right)$	Reciprocal
$= \tan x$	Algebra

Thank you, your proof is complete; Click on **Done** below to submit your answer.

Day 19 - Question #7;
Proving trigonometric identities: Problem type 2

Prove the identity.

$$\sec x - \sin x \tan x = \cos x$$

Statement	Rule
$\sec x - \sin x \tan x$	
$= \frac{1}{\cos x} - \sin x \tan x$	Reciprocal
$= \frac{1}{\cos x} - \sin x \frac{\sin x}{\cos x}$	Quotient
$= \frac{1 - \sin^2 x}{\cos x}$	Algebra
$= \frac{\cos^2 x}{\cos x}$	Pythagorean
$= \cos x$	Algebra

Day 19 - Question #8;
Proving trigonometric identities: Problem type 3

Prove the identity.

$$\frac{\cos x}{1+\sin x} = \frac{1-\sin x}{\cos x}$$

Statement	Rule
$\frac{\cos x}{1 + \sin x}$	
$= \frac{\cos x}{1 + \sin x} \frac{1 - \sin x}{1 - \sin x}$	Algebra
$= \frac{\cos x}{1 - \sin^2 x} \frac{1 - \sin x}{1}$	Algebra
$= \frac{\cos x}{\cos^2 x} \frac{1 - \sin x}{1}$	Pythagorean
$= \frac{1 - \sin x}{\cos x}$	Algebra