

## 5.2 Exercises

See [CalcChat.com](http://CalcChat.com) for tutorial help and worked-out solutions to odd-numbered exercises.

## Vocabulary

In Exercises 1 and 2, fill in the blanks.

1. An equation that is true for all real values in its domain is called an \_\_\_\_\_.
2. An equation that is true for only some values in its domain is called a \_\_\_\_\_.

In Exercises 3–8, fill in the blank to complete the fundamental trigonometric identity.

3.  $\frac{1}{\cot u} =$  \_\_\_\_\_
4.  $\frac{\cos u}{\sin u} =$  \_\_\_\_\_
5.  $\sin^2 u +$  \_\_\_\_\_  $= 1$
6.  $\cos\left(\frac{\pi}{2} - u\right) =$  \_\_\_\_\_
7.  $\csc(-u) =$  \_\_\_\_\_
8.  $\sec(-u) =$  \_\_\_\_\_

## Skills and Applications

Verifying a Trigonometric Identity In Exercises 9–50, verify the identity.

9.  $\tan t \cot t = 1$
10.  $\sec y \cos y = 1$
11.  $\cot^2 y (\sec^2 y - 1) = 1$
12.  $\cos x + \sin x \tan x = \sec x$
13.  $(1 + \sin \alpha)(1 - \sin \alpha) = \cos^2 \alpha$
14.  $\cos^2 \beta - \sin^2 \beta = 2 \cos^2 \beta - 1$
15.  $\cos^2 \beta - \sin^2 \beta = 1 - 2 \sin^2 \beta$
16.  $\sin^2 \alpha - \sin^4 \alpha = \cos^2 \alpha - \cos^4 \alpha$
17.  $\frac{\tan^2 \theta}{\sec \theta} = \sin \theta \tan \theta$
18.  $\frac{\cot^3 t}{\csc t} = \cos t (\csc^2 t - 1)$
19.  $\frac{\cot^2 t}{\csc t} = \frac{1 - \sin^2 t}{\sin t}$
20.  $\frac{1}{\tan \beta} + \tan \beta = \frac{\sec^2 \beta}{\tan \beta}$
21.  $\sin^{1/2} x \cos x - \sin^{5/2} x \cos x = \cos^3 x \sqrt{\sin x}$
22.  $\sec^6 x (\sec x \tan x) - \sec^4 x (\sec x \tan x) = \sec^5 x \tan^3 x$
23.  $\frac{\cot x}{\sec x} = \csc x - \sin x$
24.  $\frac{\sec \theta - 1}{1 - \cos \theta} = \sec \theta$
25.  $\sec x - \cos x = \sin x \tan x$
26.  $\sec x (\csc x - 2 \sin x) = \cot x - \tan x$
27.  $\frac{1}{\tan x} + \frac{1}{\cot x} = \tan x + \cot x$
28.  $\frac{1}{\sin x} - \frac{1}{\csc x} = \csc x - \sin x$
29.  $\frac{1 + \sin \theta}{\cos \theta} + \frac{\cos \theta}{1 + \sin \theta} = 2 \sec \theta$
30.  $\frac{\cos \theta \cot \theta}{1 - \sin \theta} - 1 = \csc \theta$
31.  $\frac{1}{\cos x + 1} + \frac{1}{\cos x - 1} = -2 \csc x \cot x$
32.  $\cos x - \frac{\cos x}{1 - \tan x} = \frac{\sin x \cos x}{\sin x - \cos x}$
33.  $\tan\left(\frac{\pi}{2} - \theta\right) \tan \theta = 1$
34.  $\frac{\cos[(\pi/2) - x]}{\sin[(\pi/2) - x]} = \tan x$
35.  $\frac{\tan x \cot x}{\cos x} = \sec x$
36.  $\frac{\csc(-x)}{\sec(-x)} = -\cot x$
37.  $(1 + \sin y)[1 + \sin(-y)] = \cos^2 y$
38.  $\frac{\tan x + \tan y}{1 - \tan x \tan y} = \frac{\cot x + \cot y}{\cot x \cot y - 1}$
39.  $\frac{\tan x + \cot y}{\tan x \cot y} = \tan y + \cot x$
40.  $\frac{\cos x - \cos y}{\sin x + \sin y} + \frac{\sin x - \sin y}{\cos x + \cos y} = 0$
41.  $\sqrt{\frac{1 + \sin \theta}{1 - \sin \theta}} = \frac{1 + \sin \theta}{|\cos \theta|}$
42.  $\sqrt{\frac{1 - \cos \theta}{1 + \cos \theta}} = \frac{1 - \cos \theta}{|\sin \theta|}$
43.  $\cos^2 \beta + \cos^2\left(\frac{\pi}{2} - \beta\right) = 1$
44.  $\sec^2 y - \cot^2\left(\frac{\pi}{2} - y\right) = 1$
45.  $\sin t \csc\left(\frac{\pi}{2} - t\right) = \tan t$
46.  $\sec^2\left(\frac{\pi}{2} - x\right) - 1 = \cot^2 x$
47.  $\tan(\sin^{-1} x) = \frac{x}{\sqrt{1 - x^2}}$
48.  $\cos(\sin^{-1} x) = \sqrt{1 - x^2}$
49.  $\tan\left(\sin^{-1} \frac{x - 1}{4}\right) = \frac{x - 1}{\sqrt{16 - (x - 1)^2}}$
50.  $\tan\left(\cos^{-1} \frac{x + 1}{2}\right) = \frac{\sqrt{4 - (x + 1)^2}}{x + 1}$