Trigonometric Identities
Verifying Identities 3

Verify that each of the following is an identity.

1. $\dfrac{\csc x}{\cot x + \tan x} = \cos x$

2. $\tan u + \dfrac{\cos u}{1 + \sin u} = \sec u$

3. $\sin^3 x - \cos^3 x = (1 + \sin x \cos x)(\sin x - \cos x)$

4. $\dfrac{1}{\sin y - 1} - \dfrac{1}{\sin y + 1} = -2\sec^2 y$

5. $1 - 2\sin^2 r + \sin^4 r = \cos^4 r$

6. $\dfrac{\tan x + \sec x}{\sec x - \cos x + \tan x} = \csc x$