

Verifying Trig Equations

Verify each identity.

1) $\frac{1}{\sin^2 x} = \cot^2 x + 1$

2) $\sec^2 x \sin x = \frac{\tan x}{\cos x}$

3) $\frac{\cot^2 x - \csc^2 x}{\sec x} = -\cos x$

4) $\csc^2 x - \sec^2 x = \cot^2 x - \tan^2 x$

5) $\cos^2 x \csc^2 x = \csc^2 x - 1$

6) $\frac{\cot^2 x}{\cos^2 x} = 1 + \cot^2 x$

7) $\frac{\sin x}{\tan x} = \frac{\cos x}{\cos^2 x + \sin^2 x}$

8) $\frac{\csc^2 x}{\sec^2 x} = \csc^2 x - 1$

Answers to Verifying Trig Equations

$$1) \frac{1}{\sin^2 x}$$

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

$$\csc^2 x$$

$$\text{Use } \cot^2 x + 1 = \csc^2 x$$

$$\cot^2 x + 1 \quad \blacksquare$$

$$3) \frac{\cot^2 x - \csc^2 x}{\sec x}$$

$$\text{Use } \cot^2 x + 1 = \csc^2 x$$

$$-\frac{1}{\sec x}$$

$$\text{Use } \sec x = \frac{1}{\cos x}$$

$$-\cos x \quad \blacksquare$$

$$5) \cos^2 x \csc^2 x$$

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

$$\frac{\cos^2 x}{\sin^2 x}$$

$$\text{Use } \cot x = \frac{\cos x}{\sin x}$$

$$\cot^2 x$$

$$\text{Use } \cot^2 x + 1 = \csc^2 x$$

$$\csc^2 x - 1 \quad \blacksquare$$

$$7) \frac{\sin x}{\tan x}$$

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

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

$$\text{Cancel common factors}$$

$$\cos x$$

$$\text{Use } \sin^2 x + \cos^2 x = 1$$

$$\frac{\cos x}{\cos^2 x + \sin^2 x} \quad \blacksquare$$

$$2) \sec^2 x \sin x$$

$$\text{Use } \sec x = \frac{1}{\cos x}$$

$$\frac{\sin x}{\cos^2 x}$$

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

$$\frac{\tan x}{\cos x} \quad \blacksquare$$

$$4) \csc^2 x - \sec^2 x$$

$$\text{Use } \tan^2 x + 1 = \sec^2 x$$

$$\csc^2 x - \tan^2 x - 1$$

$$\text{Use } \cot^2 x + 1 = \csc^2 x$$

$$\cot^2 x - \tan^2 x \quad \blacksquare$$

$$6) \frac{\cot^2 x}{\cos^2 x}$$

$$\text{Use } \cot x = \frac{\cos x}{\sin x}$$

$$\frac{\cos^2 x}{\cos^2 x \sin^2 x}$$

$$\text{Cancel common factors}$$

$$\frac{1}{\sin^2 x}$$

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

$$\csc^2 x$$

$$\text{Use } \cot^2 x + 1 = \csc^2 x$$

$$8) \frac{1 + \cot^2 x}{\sec^2 x}$$

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

$$\frac{1}{\sec^2 x \sin^2 x}$$

$$\text{Use } \sec x = \frac{1}{\cos x}$$

$$\frac{\cos^2 x}{\sin^2 x}$$

$$\text{Use } \cot x = \frac{\cos x}{\sin x}$$

$$\cot^2 x$$

$$\text{Use } \cot^2 x + 1 = \csc^2 x$$

$$\csc^2 x - 1 \quad \blacksquare$$