prove the algebraic identity by starting with the LHS expression and supplying a sequence of equivalent expressions that ends with the RHS expression

$$\tan x + \cot x = \sec x \csc x$$

General Strategies

- Begin with the more complicated expression and work toward the less complicated expression
- If no other move suggests itself, convert the entire expression to one involving sines and cosines
- Combine fractions by combining them over a common denominator.

Prove each identity:

$$\frac{\sin^2 x + \cos^2 x}{\cos^2 x} = \left(\frac{1}{\cos x}\right)^2$$

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

$$\frac{\sec x}{\cos x} - 1 = \frac{\sin^2 x}{\cos^2 x}$$

$$\frac{\cot^2 x}{1+\csc x} = (\cot x)(\sec x - \tan x)$$