

*Are There More Than Twenty-Eight Different Ways of Proving One Trigonometric Identity?*

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I have given the following problem: prove

$$\cos^2 \theta + \cos^2 \theta \cot^2 \theta = \cot^2 \theta$$

on my precalculus test over the years. No identities were given to the students on the test, they had to know them. Here is the "obvious" solution:

$$\begin{aligned} \cos^2 \theta + \cos^2 \theta \cot^2 \theta &= \cos^2 \theta (1 + \cot^2 \theta) = \cos^2 \theta \csc^2 \theta \\ &= \frac{\cos^2 \theta}{\sin^2 \theta} = \cot^2 \theta \end{aligned}$$

Students came up with *twenty-seven* other ways of proving it.