

Precalculus

Proving Pythagorean identity with angle sum formulas

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2019

Recall the angle sum formula $\cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta$.

Example

Show that the Pythagorean identity $\sin^2 \theta + \cos^2 \theta = 1$ follows from the angle difference formula.

$$\begin{aligned} 1 &= \cos 0 \\ &= \cos(\theta - \theta) \\ &= \cos \theta \cos \theta + \sin \theta \sin \theta \\ &= \cos^2 \theta + \sin^2 \theta, \end{aligned}$$

as desired.