

WARMUP

Copy these identities into your notes:

BASIC TRIG IDENTITIES:

Quotient: $\tan \theta = \frac{\sin \theta}{\cos \theta}$ $\cot \theta = \frac{\cos \theta}{\sin \theta}$

Reciprocal: $\csc \theta = \frac{1}{\sin \theta}$ $\sec \theta = \frac{1}{\cos \theta}$ $\cot \theta = \frac{1}{\tan \theta}$

Pythagorean: $\sin^2 \theta + \cos^2 \theta = 1 \Rightarrow \sin^2 \theta = 1 - \cos^2 \theta \Rightarrow \cos^2 \theta = 1 - \sin^2 \theta$

$$\tan^2 \theta + 1 = \sec^2 \theta \Rightarrow \tan^2 \theta = \sec^2 \theta - 1 \Rightarrow \sec^2 \theta - \tan^2 \theta = 1$$

$$1 + \cot^2 \theta = \csc^2 \theta \Rightarrow \cot^2 \theta = \csc^2 \theta - 1 \Rightarrow \csc^2 \theta - \cot^2 \theta = 1$$

Section 6.3 Trig Identities

An identity is an equation that is true for any number.

ex: $(x+1)^2 = x^2 + 2x + 1$

Establish the identity:

$$\sec \theta \cdot \sin \theta = \tan \theta$$

To do these problems, rewrite the more complicated side and use our trig identities to transform the expression to what's on the other side.

$$\sec \theta \cdot \sin \theta = \frac{1}{\cos \theta} \cdot \frac{\sin \theta}{1}$$

$$= \frac{\sin \theta}{\cos \theta}$$

$$= \tan \theta$$

ex: $\sin\theta \cdot \csc\theta - \cos^2\theta = \sin^2\theta$

$$\begin{aligned} \sin\theta \csc\theta - \cos^2\theta &= \sin\theta \cdot \frac{1}{\sin\theta} - \cos^2\theta \\ &= 1 - \cos^2\theta \\ &= \sin^2\theta \end{aligned}$$

Assignment p480 1,5,6,9,13,15

Establish each identity

1) $\csc\theta \cdot \cos\theta = \cot\theta$

5) $\cos\theta (\tan\theta + \cot\theta) = \csc\theta$

6) $\sin\theta (\cot\theta + \tan\theta) = \sec\theta$

9) $(\sec\theta - 1)(\sec\theta + 1) = \tan^2\theta$

13) $\cos^2\theta (\tan^2\theta + 1) = 1$

15) $(\sin\theta + \cos\theta)^2 + (\sin\theta - \cos\theta)^2 = 2$

$\cot^2\theta = \frac{\cos^2\theta}{\sin^2\theta}$

$\cos\theta (\tan\theta + \cot\theta)$

$= \cos\theta \tan\theta + \cos\theta \cot\theta$

$= \cos\theta \cdot \frac{\sin\theta}{\cos\theta} + \cos\theta \cdot \frac{\cos\theta}{\sin\theta}$

$= \frac{\sin\theta}{1} + \frac{\cos^2\theta}{\sin\theta}$

LCD $\rightarrow \frac{\sin^2\theta}{\sin\theta} + \frac{\cos^2\theta}{\sin\theta}$

$= \frac{\sin^2\theta + \cos^2\theta}{\sin\theta}$

$= \frac{1}{\sin\theta}$

$= \csc\theta$

15) $(\sin\theta + \cos\theta)^2 + (\sin\theta - \cos\theta)^2 = (\sin\theta + \cos\theta)(\sin\theta + \cos\theta) + (\sin\theta - \cos\theta)(\sin\theta - \cos\theta)$

$= \sin^2\theta + \cancel{2\sin\theta\cos\theta} + \cos^2\theta + \sin^2\theta - \cancel{2\sin\theta\cos\theta} + \cos^2\theta$

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

$$= 1 + 1$$

$$= 2$$