Trig Identities worksheet 3.4 name: Key

Prove each identity:

1. $\sec x - \tan x \sin x = \frac{1}{\sec x}$

$\frac{1}{\cos} - \frac{\sin}{\cos}\sin$

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

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

2. $\frac{1+\cos x}{\sin x} = \csc x + \cot x$

$\frac{1}{\sin x} + \frac{\cos x}{\sin x}$

$\csc x + \cot x = \csc x + \cot x$

3. $\frac{\sec\theta \sin\theta}{\tan\theta + \cot\theta} = \sin^2\theta$

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

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

4. $\frac{\sec\theta}{\cos\theta} - \frac{\tan\theta}{\cot\theta} = 1$

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

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

5. $\cos^2 y - \sin^2 y = 1 - 2\sin^2 y$

$1 - \sin^2 y - \sin^2 y$

$1 - 2\sin^2 y = 1 - 2\sin^2 y$

6. $\csc^2\theta \tan^2\theta - 1 = \tan^2\theta$

$\frac{1}{\sin^2\theta}\cdot\frac{\sin^2}{\cos^2} - 1$

$\frac{1}{\cos^2\theta} - 1$

$\sec^2\theta - 1$

$\tan^2\theta = \tan^2\theta$

7. $\frac{\sec^2\theta}{\sec^2\theta - 1} = \csc^2\theta$

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

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

8. $\tan^2 x \sin^2 x = \tan^2 x - \sin^2 x$

$(\sec^2 x - 1)\sin^2 x$

$\sec^2 x \sin^2 x - \sin^2 x$

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

$\tan^2 x - \sin^2 x = \tan^2 x - \sin^2 x$

16) $\frac{\sin x + \tan x}{1+\sec x} = \frac{\sin x + \frac{\sin x}{\cos x}}{1+\frac{1}{\cos x}} = \frac{\frac{\sin x \cos x + \sin x}{\cos x}}{\frac{\cos x + 1}{\cos x}}$

$\frac{\sin x \cos x + \sin x}{\cos x} \cdot \frac{\cos x}{\cos x + 1} = \frac{\sin x(\cos x + 1)}{\cos x + 1} = \sin x = \sin x$

15) $\frac{\tan\theta}{\sec\theta} + \frac{\cot\theta}{\csc\theta} = \frac{\frac{\sin\theta}{\cos\theta}}{\frac{1}{\cos\theta}} + \frac{\frac{\cos\theta}{\sin\theta}}{\frac{1}{\sin\theta}} = \sin\theta + \cos\theta$

14) $\csc^4 x - \cot^4 x = (\csc^2 x + \cot^2 x)(\csc^2 x - \cot^2 x)$

$(1+\cot^2 x + \cot^2 x)(1+\cot^2 x - \cot^2 x)$

$1 + 2\cot^2 x$

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

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

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

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

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

$\csc^2 x - \cot^2 x = \csc^2 x - \cot^2 x$

13) $\frac{\cos x + 1}{\sin^3 x} = \frac{\cos x}{\sin^3 x} + \frac{1}{\sin^3 x}$

$\sin(\sin^2)$
$\sin(1-\cos x)$

$\frac{\cot x}{\sin^2 x} + \frac{1}{\sin^3 x} = \frac{\sin\cot + 1}{\sin^3 x}$

$\frac{\cos}{\sin}\left(\frac{1}{\sin^2}\right) + \frac{1}{\sin^3}$

$\frac{\cot}{\sin^2} + \csc^3 = \frac{\frac{\cos}{\sin}}{\frac{1}{\csc^2}} = \frac{\cos\csc^2}{\sin} + \csc^3$

$\frac{\cos\csc^2 + \sin\csc^3}{\sin}$

$\frac{\csc^2(\cos + \sin\csc)}{\sin}$