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Honors Algebra II
Trig Identities

Name Answer Key
Hour ____ Date _____

Show that the left side of the equation equals the right side.

1. $\frac{\tan x}{1+\tan x} = \frac{\sin x}{\sin x + \cos x}$

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

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

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

$\frac{\sin x}{\cos x + \sin x}$ ✓

2. $\frac{\sec^4 x - 1}{\tan^2 x} = \tan^2 x + 2$

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

$\sec^2 x + 1 =$

$\tan^2 x + 1 + 1 =$

$\tan^2 x + 2$ ✓

3. $\frac{\tan x}{1+\sec x} + \frac{1+\sec x}{\tan x} = 2\csc x$

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

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

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

$\frac{2\sec x(1+\sec x)}{(1+\sec x)\tan x} =$

$\frac{2\sec x}{\tan x} =$

$\frac{\frac{2}{\cos x}}{\frac{\sin x}{\cos x}} = \frac{2}{\sin x} = 2\csc x$ ✓

4. $\cos^4 x - \sin^4 x = 1 - 2\sin^2 x$

$(\cos^2 x + \sin^2 x)(\cos^2 x - \sin^2 x) =$

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

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

$1 - 2\sin^2 x$ ✓

5. $\sec^2 x + \csc^2 x = \sec^2 x \csc^2 x$

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

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

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

$\sec^2 x \csc^2 x$ ✓

6. $\frac{1-\sin^2 x}{1+\cot^2 x} = \sin^2 x \cos^2 x$

$\frac{\cos^2 x}{\csc^2 x} =$

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

$\cos^2 x \sin^2 x$ ✓

7. $\frac{\tan^2 x}{1+\tan^2 x} = \sin^2 x$

$\frac{\tan^2 x}{\sec^2 x} =$

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

$\sin^2 x$ ✓

8. $\frac{\cos x}{1+\sin x} + \frac{1+\sin x}{\cos x} = 2\sec x$

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

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

$\cos^2 x + 1 + 2\sin x + \sin^2 x =$

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

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

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

$\frac{2}{\cos x} =$

$2\sec x$ ✓

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Honor's Alg. 2
Identities Practice

Name: Answer Key
Date: _____ Hour: _____

Simplify.

1) $\sin^2\alpha \cot\alpha \csc\alpha$

$\sin^2\alpha \cdot \frac{\cos\alpha}{\sin\alpha} \cdot \frac{1}{\sin\alpha}$

$\cos\alpha$

2) $\frac{\sin^2 x - \tan^2 x}{\tan^2 x \sin^2 x}$

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

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

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

$= -1$

3) $\frac{\tan x - \tan x \sin^2 x}{2 \sin x \cos x}$

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

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

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

$\frac{1}{2}$

4) $\frac{\cos^3\beta + \sin^3\beta}{1 - \sin\beta\cos\beta}$ a^3+b^3

$\frac{(\cos\beta + \sin\beta)(\cos^2\beta - \cos\beta\sin\beta + \sin^2\beta)}{1 - \sin\beta\cos\beta}$

$\frac{(\cos\beta + \sin\beta)(1 - \cos\beta\sin\beta)}{1 - \sin\beta\cos\beta}$

$\cos\beta + \sin\beta$

5) $\frac{\sec^2\theta}{1 + \cot^2\theta} = \tan^2\theta$

$\frac{\sec^2\theta}{\csc^2\theta} =$

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

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

$\tan^2\theta$ ✓

Prove each identity. Work on only 1 side of the equation!!!!

6) $\dfrac{\tan\lambda}{1+\tan^2\lambda} = \sin\lambda\cos\lambda$

$\dfrac{\tan\lambda}{\sec^2\lambda} =$

$\dfrac{\frac{\sin\lambda}{\cos\lambda}}{\frac{1}{\cos^2\lambda}} =$

$\dfrac{\sin\lambda}{\cos\lambda} \cdot \cos^2\lambda =$

$\sin\lambda\cos\lambda$ ✓

7) $\dfrac{\sec x+1}{\tan x} = \dfrac{\tan x}{\sec x-1} \cdot \dfrac{(\sec x+1)}{(\sec x+1)}$

$= \dfrac{\tan x(\sec x+1)}{\sec^2 x - 1}$

$= \dfrac{\tan x(\sec x+1)}{\tan^2 x}$

$= \dfrac{\sec x+1}{\tan x}$ ✓

8) $\dfrac{\cos\phi+\cot\phi}{\csc\phi+1} = \cos\phi$

$\dfrac{\sin\phi}{\sin\phi} \cdot \dfrac{\cos\phi + \frac{\cos\phi}{\sin\phi}}{\frac{1}{\sin\phi}+1} =$

$\dfrac{\sin\phi\cos\phi + \cos\phi}{\frac{\sin\phi}{\sin\phi} + \sin\phi} =$

$\dfrac{\cos\phi(\sin\phi+1)}{1+\sin\phi} =$

$\cos\phi$ ✓

9) $1+\cos x = \cot x(\sin x + \tan x)$

$1+\cos x = \dfrac{\cos x}{\sin x}\left(\sin x + \dfrac{\sin x}{\cos x}\right)$

$1+\cos x = \dfrac{\sin x\cos x}{\sin x} + \dfrac{\cos x\sin x}{\sin x\cos x}$

$= \cos x + 1$ ✓