Name_____ **Date**_____ **Period**_____

Homework 10.1

Express each of the following expressions in simplest form and in terms of only sin x or cos x. Show your work.

1. $\frac{\cot x}{\csc x}$

$= \cot x \cdot \frac{1}{\csc x}$

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

$= \cos x$

2. $\frac{\tan \theta}{\sec \theta} = \tan\theta \cdot \frac{1}{\sec\theta}$

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

$= \sin\theta$

3. $\sec x \tan x$

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

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

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

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

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

4. $\frac{1+\cot\theta}{\sin\theta+\cos\theta} = \frac{\frac{\sin\theta}{\sin\theta} + \frac{\cos\theta}{\sin\theta}}{\sin\theta + \cos\theta}$

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

$= \frac{(\sin\theta + \cos\theta)}{(\sin\theta + \cos\theta)\sin\theta}$

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

5. $csc\,\theta\,(1-cos\,\theta)(1+cos\,\theta)$

$= \csc\theta\,(1-\cos^2\theta)$

$= \csc\theta\,(\sin^2\theta)$

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

$= \sin\theta$

OPTIONAL

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

$\sin^2\theta=1-\cos^2\theta$

Express each of the following trigonometric expressions in terms of a single trigonometric ratio.

6. $sec\,\alpha\,(cos\,\alpha+sin^2\,\alpha\,sec\,\alpha)$

$= 1+\sin^2\alpha\sec^2\alpha$

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

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

$= 1+\tan^2\alpha$

$= \sec^2\alpha$

7. $csc\,\theta\,(csc\,\theta+cot\,\theta)$

$= \csc^2\theta+\csc\theta\cdot\cot\theta$

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

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

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

$\sin^2\theta=1-\cos^2\theta$

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

$= \frac{(1+\cos\theta)}{(1-\cos\theta)(1+\cos\theta)}$

$= \frac{1}{1-\cos\theta}$

8. $\frac{\csc\theta-\sin\theta}{\cos\theta}$

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

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

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

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

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

$= \cot\theta$

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

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

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

$= \cot\theta$

10. $\sin\beta\,(\cos\beta+\sin\beta\tan\beta)$

$= \sin\beta\cos\beta+\sin^2\beta\tan\beta$

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

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

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

$= \frac{\sin\beta(1)}{\cos\beta}$

$= \tan\beta$

11. $\csc x\,(\sec x-\cos x)$

$= \csc x\cdot\sec x-\csc x\cos x$

$= \frac{1}{\sin x\cos x}-\frac{1}{\sin x}\cdot\cos x\cdot\frac{\cos x}{\cos x}$

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

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

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

$= \tan x$

12. $\frac{\cos\theta}{1+\sin\theta} + \tan\theta$

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

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

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

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

$= \sec\theta$

13. Completely simplify the following trigonometric

$\frac{(1+\cos\theta)}{(1+\cos\theta)}\frac{\csc\theta}{(1+\sec\theta)} - \frac{\cot\theta}{(1+\cos\theta)}\frac{(1+\sec\theta)}{(1+\sec\theta)}$

$= \frac{(\csc\theta + \csc\theta\cos\theta) - (\cot\theta + \sec\theta\cot\theta)}{(1+\sec\theta)(1+\cos\theta)}$

$= \frac{\frac{1}{\sin\theta} + \frac{\cos\theta}{\sin\theta} - \frac{\cos\theta}{\sin\theta} - \frac{1}{\cancel{\cos\theta}}\frac{\cancel{\cos\theta}}{\sin\theta}}{(1+\sec\theta)(1+\cos\theta)}$

$= \frac{\frac{1+\cos\theta-\cos\theta-1}{\sin\theta}}{(1+\sec\theta)(1+\cos\theta)}$

$= \frac{\frac{0}{\sin\theta}}{(1+\sec\theta)(1+\cos\theta)}$

$= \ddot\smile$