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Lesson 6.2A – Trigonometric Expressions

I. Trigonometric Identities (You are responsible for knowing these. Relax… there are tricks).

Reciprocal Identities

$\sin u = \frac{1}{\csc u}$ $\quad \csc u = \frac{1}{\sin u}$

$\cos u = \frac{1}{\sec u}$ $\quad \sec u = \frac{1}{\cos u}$

$\tan u = \frac{1}{\cot u}$ $\quad \cot u = \frac{1}{\tan u}$

Quotient Identities

$$\tan u = \frac{\sin u}{\cos u}$$

$$\cot u = \frac{\cos u}{\sin u}$$

Pythagorean Identities

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

$$1 + \tan^2 u = \sec^2 u$$

$$1 + \cot^2 u = \csc^2 u$$

Simplify.

1. $\cos\theta \tan\theta$

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

$\sin\theta$

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

$\sec^2 x(\cos^2 x)$

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

1

3. $\sin^2 x \csc^2 x - \sin^2 x$

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

$1 - \sin^2 x$

$\cos^2 x$

4. $\frac{\cot\theta}{\csc\theta}$

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

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

$\cos\theta$

II. Practice: Simplify the trigonometric expressions. There is more than one correct form… but some forms are simpler-looking than others. Do your best!

5. $\frac{\csc\theta}{\sec\theta}$

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

6. $\sec\theta \cos\theta$

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

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

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

$1-\cos^2\theta$

$\sin^2\theta$

8. $-\cos^2\theta-\tan^2\theta\cos^2\theta$

$-\cos^2\theta(1+\tan^2\theta)$

$-\cos^2\theta(\sec^2\theta)$

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

-1

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

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

$\sin x$

10. $(1+\tan^2 x)\cos x$

$(\sec^2 x)\cos x$

$\left(\frac{1}{\cos^2 x}\right)\cos x$

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

11. $2\tan^2 x-2\sec^2 x$

$2(\tan^2 x-\sec^2 x)$

$2(-1)=-2$

12. $\frac{\cos^2(x)-4}{\cos(x)-2}$

$\frac{(\cos(x)-2)(\cos(x)+2)}{\cos(x)-2}$

$\cos(x)+2$