

Name _____

Date _____

Practice 8.1b: Fundamental Trig Identities

1. Use the Fundamental Trig Identities to simplify the following expressions.

a. $\frac{\sin(-\alpha)}{\cos \alpha}$

b. $\frac{\tan^2 \theta}{\sec^2 \theta}$

c. $\cos(90^\circ - x) \sec x$

d. $\cot\left(\frac{\pi}{2} - \sigma\right) \cos \sigma$

e. $\frac{\cos^2 \mu}{1 - \sin \mu}$

f. $\cos t (1 + \tan^2 t)$

2. **Factor the expression** and then use the Fun. Trig Identities to simplify the expressions.

a. $\tan^2 x - \tan^2 x \sin^2 x$

b. $\sec^2 y \tan^2 y + \sec^2 y$

c. $\frac{\sec^2 \alpha - 1}{\sec \alpha - 1}$

d. $\frac{\csc^2 \gamma - 1}{\csc \gamma + 1}$

e. $\tan^4 x + 2\tan^2 x + 1$

f. $\sin^4 z - \cos^4 z$

3. **Multiply** then use the Fundamental Trig Identities to simplify the expressions.

a. $(\sin x + \cos x)^2$
 $(\sin x + \cos x)(\sin x + \cos x)$
 $\sin^2 x + 2\sin x \cos x + \cos^2 x$

b. $(\cot x + \csc x)(\cot x - \csc x)$
 $\cot^2 x - \csc^2 x$
 $\cancel{\csc^2 x} - 1 - \cancel{\csc^2 x} = -1$

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

c. $(\sec x + 1)(\sec x - 1)$

d. $(3 - 3\sin x)(3 + 3\sin x)$

4. **Add or Subtract** then use the Fundamental Trig Identities to simplify the expressions.

a. $\frac{1 - \cos \sigma}{1 - \cos \sigma} \cdot \frac{1}{1 + \cos \sigma} + \frac{1}{1 - \cos \sigma} \cdot \frac{1 + \cos \sigma}{1 + \cos \sigma}$

b. $\frac{1}{\sec \alpha + 1} - \frac{1}{\sec \alpha - 1}$

$\frac{1 - \cancel{\cos \sigma} + 1 + \cancel{\cos \sigma}}{1 - \cos^2 \sigma} = \frac{2}{\sin^2 \sigma} = 2 \csc^2 \sigma$

c. $\frac{\cos \phi}{1 + \sin \phi} + \frac{1 + \sin \phi}{\cos \phi}$

d. $\frac{\tan \mu}{\tan \mu} \cdot \tan \mu - \frac{\sec^2 \mu}{\tan \mu}$
 $\frac{\tan^2 \mu}{\tan \mu} - \frac{\sec^2 \mu}{\tan \mu}$
 $\frac{\tan^2 \mu - \sec^2 \mu}{\tan \mu} = \frac{\tan^2 \mu - (1 + \tan^2 \mu)}{\tan \mu} = \frac{-1}{\tan \mu} = -\cot \mu$

5. Use the trig substitution to rewrite the function as a trig function of θ , where $0^\circ < \theta < 90^\circ$.

a. $\sqrt{25 - x^2}$ $x = 5 \sin \theta$

b. $\sqrt{16 - x^2}$ $x = 4 \cos \theta$

$\sqrt{25 - (5 \sin \theta)^2}$
 $\sqrt{25 - 25 \sin^2 \theta}$
 $\sqrt{25(1 - \sin^2 \theta)}$
 $\sqrt{25 \cos^2 \theta} = 5 \cos \theta$

c. $\sqrt{x^2 - 9}$ $x = 3 \sec \theta$

d. $\sqrt{x^2 + 100}$ $x = 10 \tan \theta$