

§5.1 Using Fundamental Identities

Fundamental Trigonometric Identities

Reciprocal Identities

$$\begin{array}{lll} \sin \theta = \frac{1}{\csc \theta} & \cos \theta = \frac{1}{\sec \theta} & \tan \theta = \frac{1}{\cot \theta} \\ \csc \theta = \frac{1}{\sin \theta} & \sec \theta = \frac{1}{\cos \theta} & \cot \theta = \frac{1}{\tan \theta} \end{array}$$

Quotient or Ratio Identities

$$\tan \theta = \frac{\sin \theta}{\cos \theta} \qquad \cot \theta = \frac{\cos \theta}{\sin \theta}$$

Pythagorean Identities

$$\sin^2 \theta + \cos^2 \theta = 1 \qquad \tan^2 \theta + 1 = \sec^2 \theta \qquad 1 + \cot^2 \theta = \csc^2 \theta$$

Cofunction Identities

$$\begin{array}{lll} \sin(90^\circ - \theta) = \cos \theta & \cos(90^\circ - \theta) = \sin \theta & \tan(90^\circ - \theta) = \cot \theta \\ \csc(90^\circ - \theta) = \sec \theta & \sec(90^\circ - \theta) = \csc \theta & \cot(90^\circ - \theta) = \tan \theta \end{array}$$

Even and Odd Trigonometric Functions

The cosine and secant functions are **even**.

$$\cos(-t) = \cos t \qquad \sec(-t) = \sec t$$

The sine, cosecant, tangent, and cotangent functions are **odd**.

$$\sin(-t) = -\sin(t) \qquad \csc(-t) = -\csc(t)$$

$$\tan(-t) = -\tan(t) \qquad \cot(-t) = -\cot(t)$$

Example 1 Use the values $\sec u = \frac{-3}{2}$ and $\tan u > 0$ to find the values of all six trig functions.

Example 2 Simplify: $\sin x \cos^2 x - \sin x$

Example 3 Factor: a) $\sec^2 - 1$

b) $4 \tan^2 + \tan - 3$

Example 4 Factor: $\csc^2 x - \cot x - 3$

Example 5 Simplify: $\sin t + \cot t \cos t$

Example 6 Perform the addition and simplify: $\frac{\sin}{1 + \cos} + \frac{\cos}{\sin}$

HW pg 359 1-67 ODDS