

Section 5.3 Intro to Trig Identities

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

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

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

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

$$\cot \theta = \frac{1}{\tan \theta}$$

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

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

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

Pythagorean Identities

Note that $\sin^2 \theta = (\sin \theta)^2$

ex 26 p 411 $\sin \theta = \frac{4}{5}$ $\cos \theta = -\frac{3}{5}$

WAY 1: use identities

$$\tan \theta = \frac{\sin \theta}{\cos \theta} = \frac{4/5}{-3/5} = \frac{4}{\cancel{5}} \cdot \frac{-\cancel{5}}{3} = -\frac{4}{3}$$

$$\cot \theta = \frac{1}{\tan \theta} = -\frac{3}{4}$$

$$\csc \theta = \frac{1}{\sin \theta} = \frac{5}{4}$$

$$\sec \theta = \frac{1}{\cos \theta} = -\frac{5}{3}$$

WAY 2: Use x , y , and r

$$\sin \theta = \frac{y}{r} = \frac{4}{5} \quad x = -3$$

$$\cos \theta = \frac{x}{r} = -\frac{3}{5} \quad y = 4$$

$$r = 5$$

$$\tan \theta = \frac{y}{x} = -\frac{4}{3} \quad \csc \theta = \frac{r}{y} = \frac{5}{4}$$

$$\cot \theta = \frac{x}{y} = -\frac{3}{4} \quad \sec \theta = \frac{r}{x} = -\frac{5}{3}$$

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$$\cos \theta = -\frac{1}{4}$$

$$\cos \theta < 0$$

$$\tan \theta > 0$$

Q III

$$x < 0$$

$$y < 0$$

$$r > 0$$

$$\cos \theta = -\frac{1}{4} = \frac{x}{r}$$

$$x = -1$$

$$r = 4$$

$$\sin \theta = -\frac{\sqrt{15}}{4}$$

$$\tan \theta = \frac{-\sqrt{15}}{-1} = \sqrt{15}$$

$$(-1)^2 + y^2 = 4^2$$

$$1 + y^2 = 16$$

$$y^2 = 15$$

$$y = -\sqrt{15}$$

$$\csc \theta = \frac{4}{-\sqrt{15}} \cdot \frac{\sqrt{15}}{\sqrt{15}} = -\frac{4\sqrt{15}}{15}$$

$$\sec \theta = -\frac{4}{1} = -4$$

$$\cot \theta = \frac{1}{\sqrt{15}} \cdot \frac{\sqrt{15}}{\sqrt{15}} = \frac{\sqrt{15}}{15}$$

EVEN ODD PROPERTIES

$$\begin{array}{l} \text{O} \\ \text{D} \\ \text{D} \end{array} \left\{ \begin{array}{l} \sin(-\theta) = -\sin \theta \\ \csc(-\theta) = -\csc \theta \\ \tan(-\theta) = -\tan \theta \\ \cot(-\theta) = -\cot \theta \end{array} \right.$$

$$\begin{array}{l} \text{E} \\ \text{V} \\ \text{E} \\ \text{N} \end{array} \left\{ \begin{array}{l} \cos(-\theta) = \cos \theta \\ \sec(-\theta) = \sec \theta \end{array} \right.$$

$$\sin(-135^\circ) = -\sin 135^\circ = -\frac{\sqrt{2}}{2}$$

$$\cos\left(-\frac{\pi}{3}\right) = \cos \frac{\pi}{3} = \frac{1}{2}$$

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