

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

$$\tan \theta = \frac{\sin \theta}{\cos \theta} = \frac{\frac{4}{5}}{-\frac{3}{5}} = \frac{4}{5} \cdot \left(-\frac{5}{3}\right) = -\frac{4}{3}$$

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

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

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

WAY 2: use x, y, r

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

$$x = -3$$

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

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

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

ex 42 p 412

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

$\underbrace{\hspace{2cm}}_{\cos \theta < 0}$

$$\tan \theta > 0$$

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

$$\boxed{x = -1} \quad \boxed{r = 4}$$

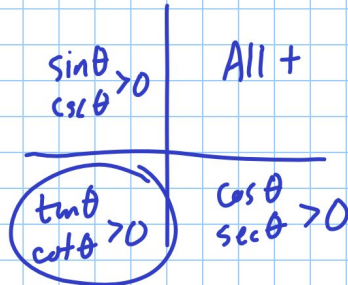
$$(-1)^2 + y^2 = 4^2$$

Q III

$$x < 0$$

$$y < 0$$

$$r > 0$$



$$1^2 + y^2 = 16$$

$$y^2 = 15$$

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

negative because
we're in Q. III

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

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

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

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

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

EVEN ODD PROPERTIES

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

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

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

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

p 411-412

25-73 eoo, 83