

Section 5.3 Intro to Trig Identities

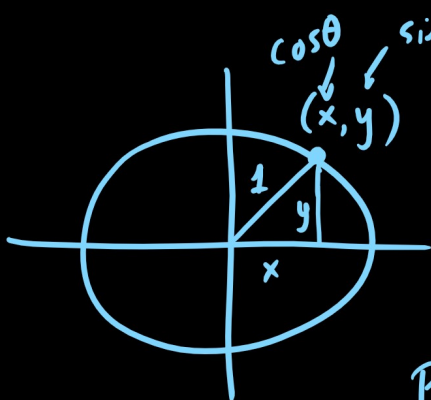
$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

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

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

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

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



$$x^2 + y^2 = 1^2$$

Pythagorean Identities

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

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

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

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

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

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

$$\sin \theta = \frac{y}{r}$$

$$\csc \theta = \frac{r}{y}$$

$$\cos \theta = \frac{x}{r}$$

$$\sec \theta = \frac{r}{x}$$

$$\tan \theta = \frac{y}{x}$$

$$\cot \theta = \frac{x}{y}$$

WAY 1: use identities

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

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

WAY 2: use x, y, r

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

$$x = -3$$

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

$$y = 4$$

$$r = 5$$

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

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

$$\frac{10}{-5} = -\frac{10}{5} = -\frac{10}{5}$$

$$\tan \theta = \frac{y}{x} = -\frac{4}{3}$$

$$\csc \theta = \frac{r}{y} = \frac{5}{4}$$

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

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

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$$\cos \theta = -\frac{1}{4} \quad \tan \theta > 0$$

$\underbrace{\hspace{10em}}_{\cos \theta < 0}$

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

$$\begin{aligned} x &= -1 \\ y &= -\sqrt{15} \\ r &= 4 \end{aligned}$$

$$x^2 + y^2 = r^2$$

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

$$1 + y^2 = 16$$

$$y^2 = 15$$

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

<u>II</u>	<u>I</u>
$x < 0$ $y > 0$	$x > 0$ $y > 0$
$x < 0$ $y < 0$	$x > 0$ $y < 0$
<u>III</u>	<u>IV</u>

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

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

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

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

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

EVEN ODD PROPERTIES

$$\text{ODD} \left\{ \begin{aligned} \sin(-\theta) &= -\sin \theta \\ \csc(-\theta) &= -\csc \theta \\ \tan(-\theta) &= -\tan \theta \end{aligned} \right.$$

$$\text{EVEN} \left\{ \begin{aligned} \cos(-\theta) &= \cos \theta \\ \sec(-\theta) &= \sec \theta \end{aligned} \right.$$

$f(-x) = f(x)$

$$f(-x) = -f(x) \quad \left\{ \begin{array}{l} \cot(-\theta) = -\cot\theta \end{array} \right.$$

$$\begin{aligned} \cot(-120^\circ) &= -\cot 120^\circ = -\left(-\frac{\sqrt{3}}{3}\right) \\ &= \frac{\sqrt{3}}{3} \end{aligned}$$

$$\sec\left(-\frac{7\pi}{6}\right) = \sec\frac{7\pi}{6} = -\frac{2\sqrt{3}}{3}$$

p 411-412 25, 31, 37, 41, 49-73 eoo