Section 5.3 Intro to Trig Identities

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

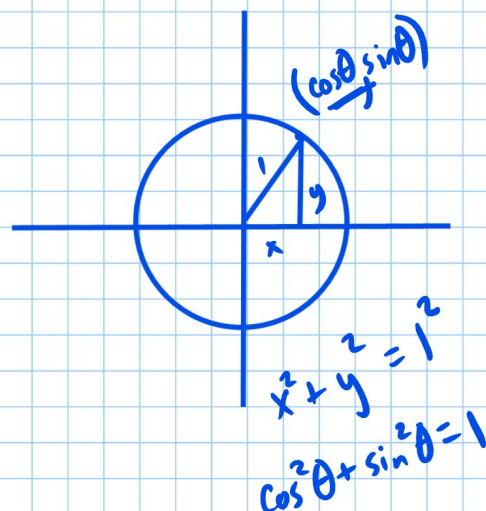$$\csc\theta = \frac{1}{\sin\theta} \qquad \sec\theta = \frac{1}{\cos\theta} \qquad \cot\theta = \frac{1}{\tan\theta}$$

Pythagorean Identities

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

$$\sin^2\theta = \left(\sin\theta\right)^2$$

$(\cos\theta, \sin\theta)$

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

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

ex: $\cos 40° \cdot \sec 40° = \cos 40° \cdot \dfrac{1}{\cos 40°} = 1$

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

$$\cos\theta = \frac{1}{\sec^2\theta}$$

$$\sin^2\frac{\pi}{12} + \frac{1}{\sec^2\frac{\pi}{12}}$$

$$= \sin^2\frac{\pi}{12} + \cos^2\frac{\pi}{12} = 1$$

ex: If $\sin\theta = \frac{4}{5}$ and $\cos\theta = -\frac{3}{5}$ find the other 4
trig function values

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

Use $\sin\theta = \frac{y}{r}$ $\csc\theta = \frac{r}{y}$ $\tan\theta = \frac{4}{-3} = -\frac{4}{3}$

$\cos\theta = \frac{x}{r}$ $\sec\theta = \frac{r}{x}$ $\cot\theta = -\frac{3}{4}$

$\tan\theta = \frac{y}{x}$ $\cot\theta = \frac{x}{y}$ $\sec\theta = \frac{5}{-3} = -\frac{5}{3}$

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

What quadrant is θ in? Q II

ex 42 p412 $\cos\theta = -\frac{1}{4}$ $\tan\theta > 0$

$\cos\theta < 0$

$Q\, III$

$-5^2 = -1 \cdot 5^2$
$= -1 \cdot 25$
$= -25$

$(-5)^2 = (-5)(-5)$
$= 25$

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

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

$1 + y^2 = 16$

$y^2 = 15$

$y = -\sqrt{15}$

$\hookleftarrow Q\,III$

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

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

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

$= \sqrt{15}$ $= \frac{\sqrt{15}}{15}$

If $f(-x) = -f(x)$ then f is odd: If $f(-x) = f(x)$, then f is even:

EVEN - ODD PROPERTIES:

ODD $\begin{cases} \sin(-\theta) = -\sin\theta \\ \tan(-\theta) = -\tan\theta \\ \csc(-\theta) = -\csc\theta \end{cases}$

EVEN $\begin{cases} \cos(-\theta) = \cos\theta \\ \sec(-\theta) = \sec\theta \end{cases}$

$\big\lfloor \cot(-\theta) = -\cot\theta$

$\cos(-120°) = \cos 120° = -\frac{1}{2}$

$\csc\left(-\frac{7\pi}{6}\right) = -\csc\frac{7\pi}{6} = -(-2) = 2$

$\big\rbrace$ p411-412   25, 33, 38, 44, 49-73 eoo