24. A motorcyclist dangerously rides his bike at a rate of 120 miles per hour. If the diameter of the front wheel is 24 inches, find the angular speed of the wheel in revolutions per minute.

$V = 120\ mi/h$; $r = 12\ in$; $\omega = ?\ rev/min$ $\quad \frac{V}{r} = \frac{r\omega}{r}$

$$\omega = \frac{V}{r} = \frac{V}{1} \cdot \frac{1}{r}$$

$$= \frac{120\ mi}{h} \cdot \frac{1}{12\ in} \cdot \frac{1\ h}{60\ min} \cdot \frac{12\ in}{1\ ft} \cdot \frac{5280\ ft}{1\ mi} \cdot \frac{1\ rev}{2\pi}$$

$$= \boxed{\frac{5280}{\pi}\ rev/min}$$

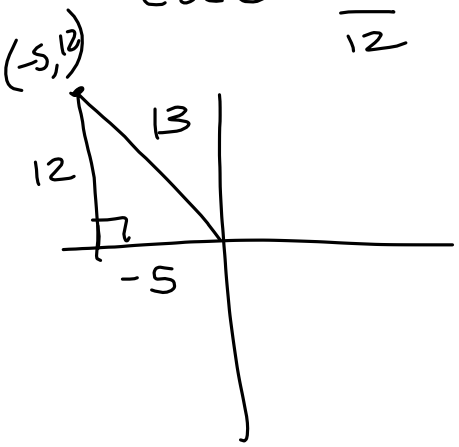
69. $r = \frac{36.32}{2}\ in = 18.16$; $\theta = ?\ rad$; $s = 1\ mi$

$$\frac{s}{r} = \frac{r\theta}{r} = \frac{1\ mi}{18.16\ in}$$

$$= \frac{1\ mi}{1} \cdot \frac{2}{36.32\ in} \cdot \frac{12\ in}{1\ ft} \cdot \frac{5280\ ft}{1\ mi}$$

$$= \frac{2 \cdot 12 \cdot 5280}{36.32}\ rad \approx \boxed{3489\ rad}$$

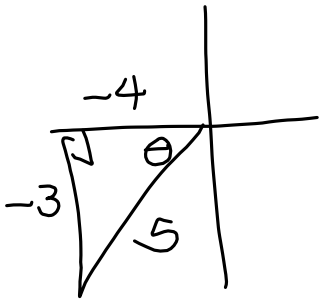
$\csc\theta = \frac{13}{12}$

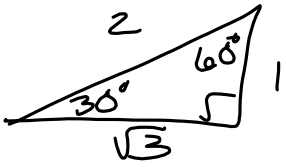


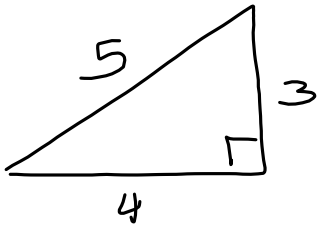
$\sin\theta = \frac{-3}{5}$; $\theta \in$ QIII

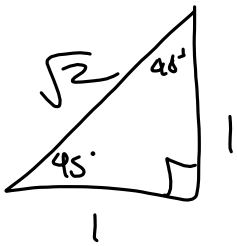
$\sec\theta = ?$

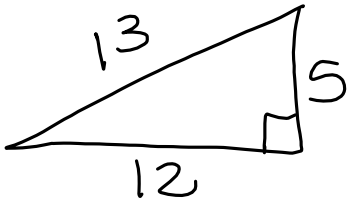
$-\frac{5}{4}$



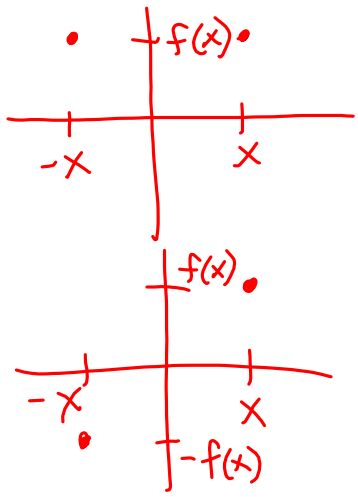








A function is a relation in which each input is mapped to a unique output.



Even/Odd Functions

A function f is even if $f(-x) = f(x)$ — cos, sec

even functions are symmetric with respect to the y-axis

A function f is odd if $f(-x) = -f(x)$ — sin, csc, tan, cot

odd functions are symmetric with respect to the origin

Odd-Even Identities

$$\cos(-x) = \cos x \quad , \quad \sin(-x) = -\sin x \quad , \quad \tan(-x) = -\tan x$$
$$\sec(-x) = \sec x \quad , \quad \csc(-x) = -\csc x \quad , \quad \cot(-x) = -\cot x$$

Domain/Range

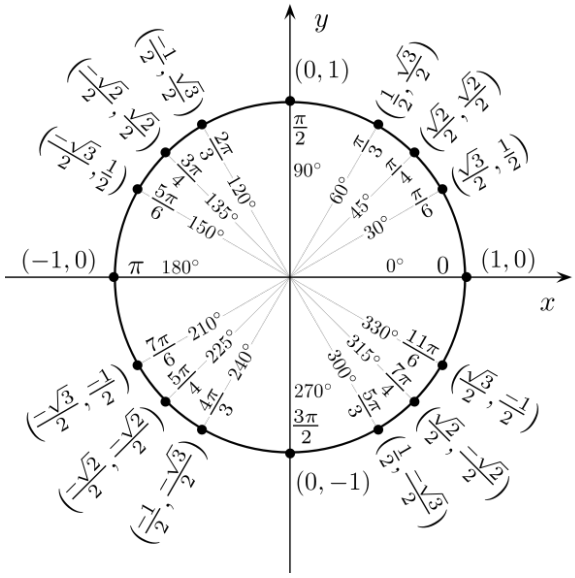
The domain of a function is the set of all input values for which the function is defined (all the x-values that "make sense" when plugged into the function)

The range of a function is the output of the domain (all the y-values that the function takes on)

Periodicity

The period of a function is the smallest interval over which the function repeats itself

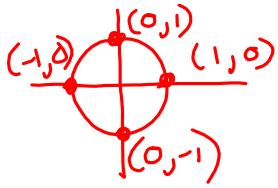
Determining domain, range and period for the Sine & Cosine functions



	sin(x)	cos(x)
Domain	$(-\infty,\infty)$ $\mathbb{R}$ $\{x \mid x \in \mathbb{R}\}$	$(-\infty,\infty)$
Range	$[-1,1]$ $\{x \mid -1 \le x \le 1\}$	$[-1,1]$
Period	2π or $360°$	2π

Graphs of the sine and cosine functions

y=sinx



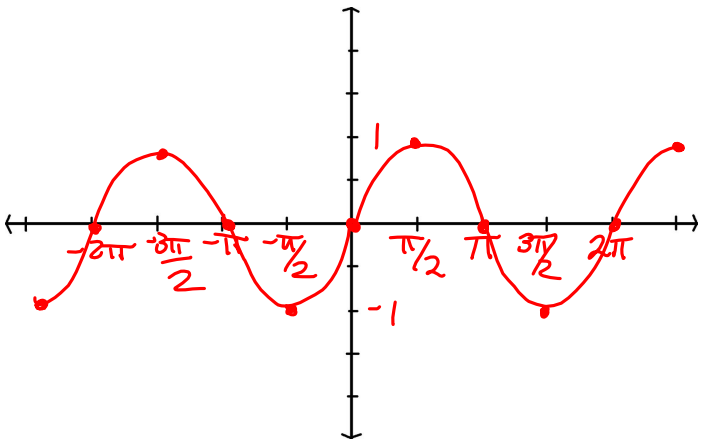
domain: $(-\infty,\infty)$

range: $[-1,1]$

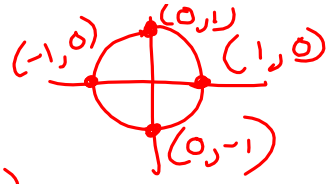
period: 2π

odd: $\sin(-x) = -\sin x$

symmetry about the origin



y=cosx



domain:
$(-\infty, \infty)$

range:
$[-1, 1]$

period: 2π

even $\cos(-x) = \cos x$

symmetry w.r.t. origin