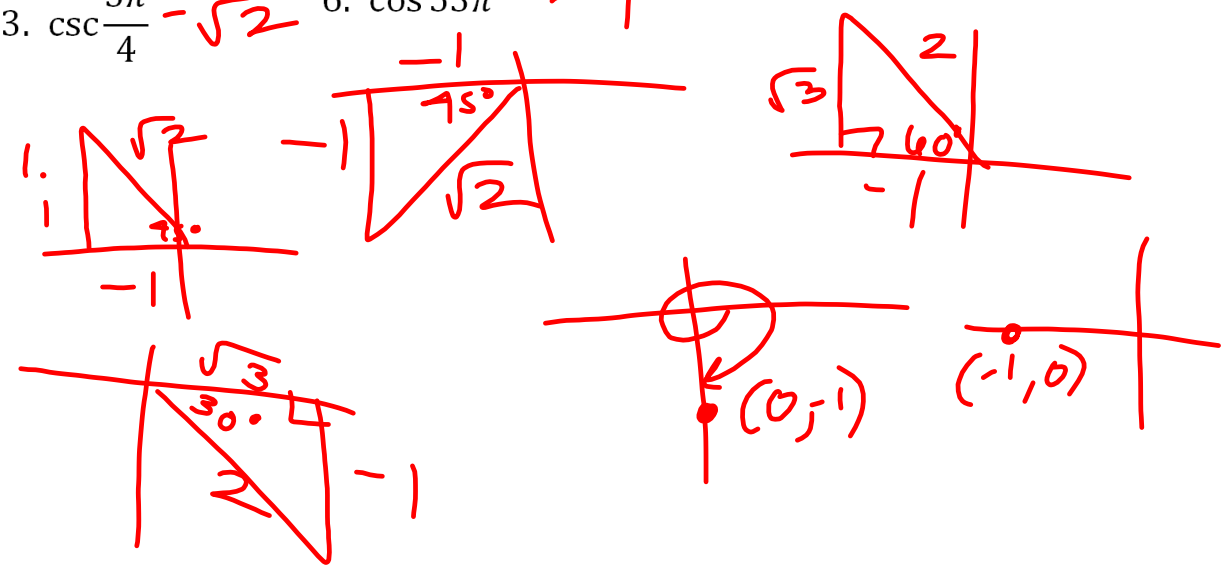
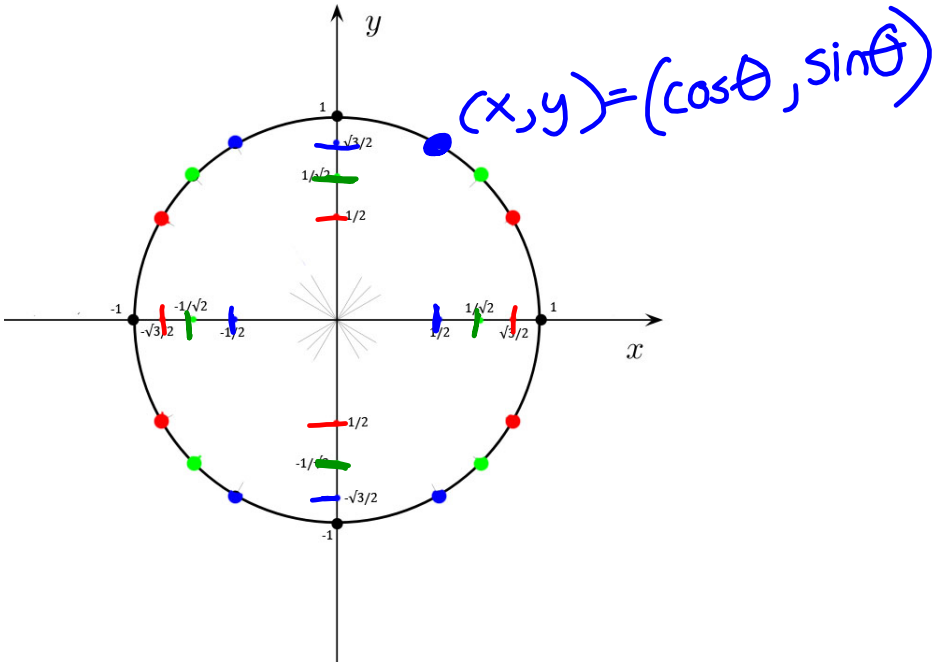
Evaluate the following:

1. $\sin 135°$ $1/\sqrt{2}$
2. $\tan \frac{11\pi}{6}$ $-1/\sqrt{3}$
3. $\csc \frac{5\pi}{4}$ $-\sqrt{2}$
4. $\cot(-450°)$ 0
5. $\cos \frac{2\pi}{3}$ $-1/2$
6. $\cos 53\pi$ -1



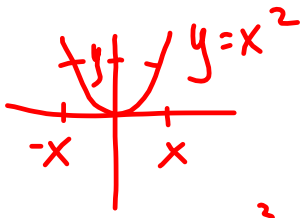
5.5 Circular Functions

Reflections on the Unit Circle

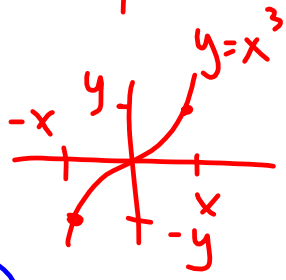


Even/Odd Functions

A function f is even if $f(-x) = f(x)$



A function f is odd if $f(-x) = -f(x)$



38. $C(x) = \frac{\cos x}{x}$

$C(-x) = \frac{\cos(-x)}{-x} = \frac{\cos x}{-x} = -\left(\frac{\cos x}{x}\right) = -C(x)$

$\Rightarrow C$ is odd

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

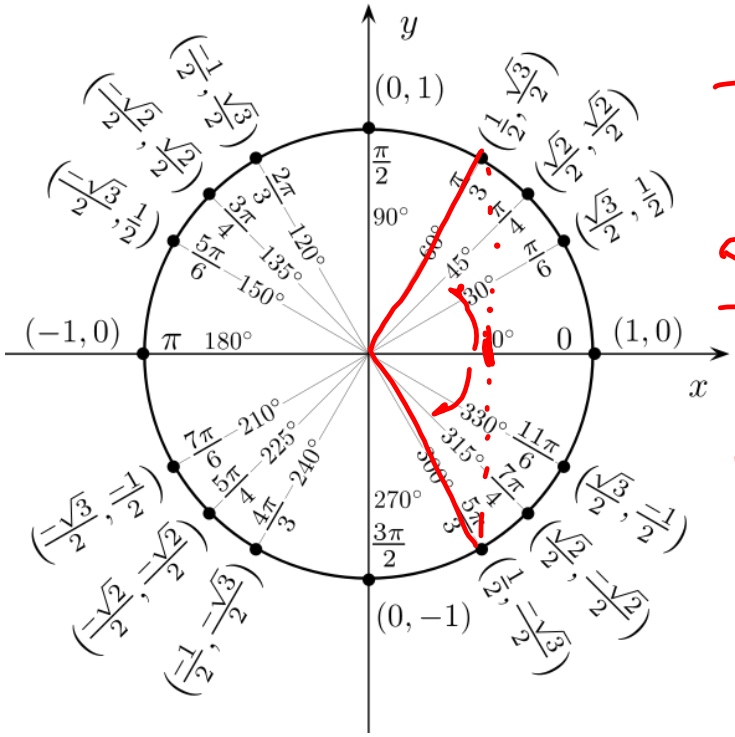
The domain of a function is the set of all input values for which the function is defined (all the x-values that "make sense" when plugged into the function)

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	Cos
Domain	all real numbers $\mathbb{R}$ $(-\infty, \infty)$	$(-\infty, \infty)$
Range	$\{x \in \mathbb{R} \mid -1 \le x \le 1\}$ $[-1, 1]$	$[-1, 1]$
Period	2π	2π

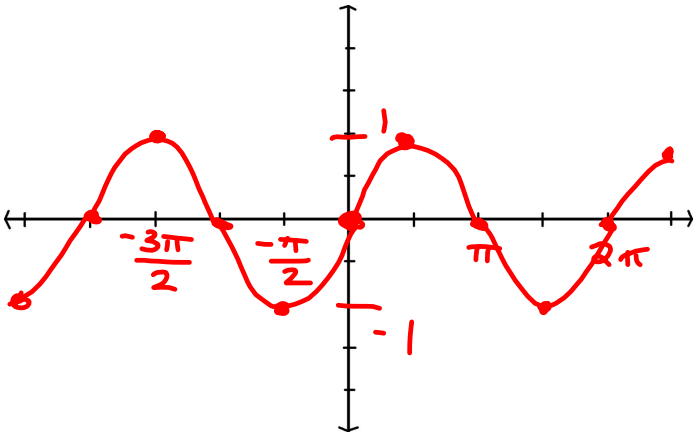
Graphs of the sine and cosine functions

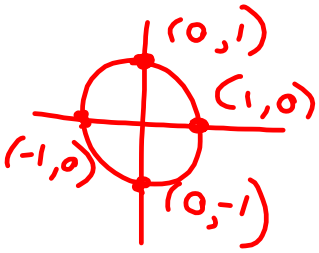
y=sinx

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

range: $[-1, 1]$

period: 2π



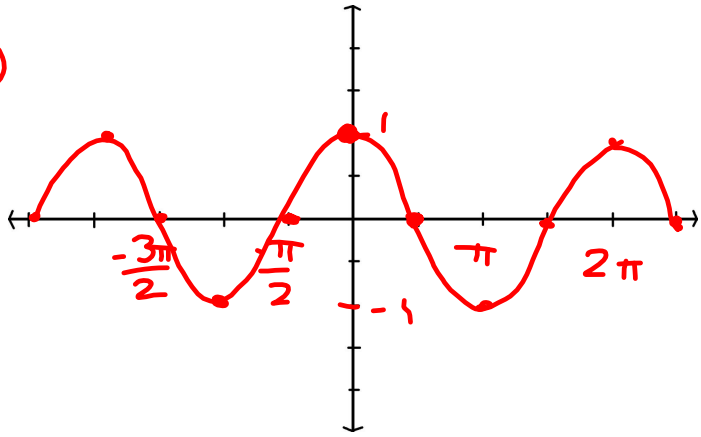


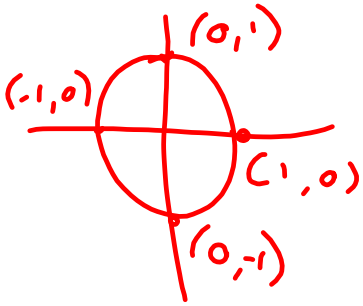
y=cosx

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

range: $[-1, 1]$

period: 2π





Domain/Range/Period/Graphs of the other 4 Trig functions?

Function	Domain	Range	Period
$y = \sin x$	$(-\infty, \infty)$	$[-1,1]$	2π
$y = \cos x$	$(-\infty, \infty)$	$[-1,1]$	2π
$y = \csc x$	$\{x \mid x \text{ is not an integer multiple of } \pi\}$	$(-\infty, -1] \cup [1, \infty)$	2π
$y = \sec x$	$\left\{x \mid x \text{ is not an odd multiple of } \frac{\pi}{2}\right\}$	$(-\infty, -1] \cup [1, \infty)$	2π
$y = \tan x$	$\left\{x \mid x \text{ is not an odd multiple of } \frac{\pi}{2}\right\}$	$(-\infty, \infty)$	π
$y = \cot x$	$\{x \mid x \text{ is not an integer multiple of } \pi\}$	$(-\infty, \infty)$	π

Why?

Identities

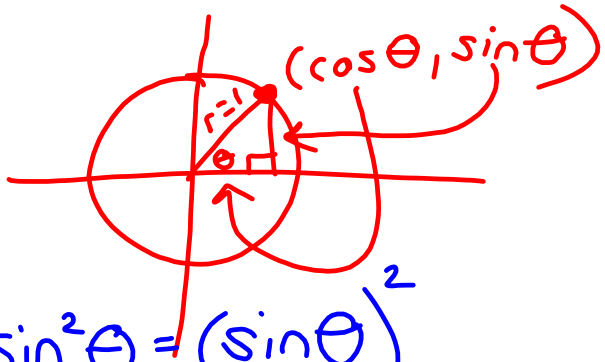
reciprical

ratio

pythagorean

$$\sin x = \frac{1}{\csc x}, \quad \cot x = \frac{1}{\tan x}$$

$$\tan x = \frac{\sin x}{\cos x}, \quad \cot x = \frac{\cos x}{\sin x}$$



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

$$\boxed{\sin^2\theta + \cos^2\theta = 1}$$

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

$$\neq \sin\theta^2 = \sin(\theta^2)$$

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

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

$$\boxed{1 + \cot^2\theta = \csc^2\theta}$$

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

$$\boxed{\tan^2\theta + 1 = \sec^2\theta}$$

Reciprocal Identities

$\csc x = \frac{1}{\sin x}$, $\sin x = \frac{1}{\csc x}$

$\sec x = \frac{1}{\cos x}$, $\cos x = \frac{1}{\sec x}$

$\cot x = \frac{1}{\tan x}$, $\tan x = \frac{1}{\cot x}$

Ratio Identities

$\tan x = \frac{\sin x}{\cos x}$, $\cot x = \frac{\cos x}{\sin x}$

Odd-Even Identities

$\cos(-x) = \cos x$, $\sin(-x) = -\sin x$, $\tan(-x) = -\tan x$

$\sec(-x) = \sec x$, $\csc(-x) = -\csc x$, $\cot(-x) = -\cot x$

Pythagorean Identities

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

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

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

Use the trigonometric identities to write each expression in terms of a single trigonometric function or constant.

50. $\cot t \sin t = \frac{\cos t}{\sin t} \cdot \frac{\sin t}{1} = \cos t$

54. $1 - \csc^2 t = -\cot^2 x$ $\quad \sin^2 x + \cos^2 x = 1$

$\quad 1 + \cot^2 x = \csc^2 x$

$\quad 1 - \csc^2 x = -\cot^2 x$

56. $\frac{\csc^2 t}{\cot t} - \frac{\cot t}{1} \cdot \frac{\cot t}{\cot t} = \frac{\csc^2 t - \cot^2 t}{\cot t} = \frac{1}{\cot t}$

$\frac{\frac{1}{\sin^2 x}}{\frac{\cos t}{\sin t}} - \frac{\cos t}{\sin t} = \frac{1}{\sin t} \cdot \frac{\sin t}{\cos t} - \frac{\cos t}{\sin t}$

$= \frac{1}{\sin t \cos t} - \frac{\cos t}{\sin t} \cdot \frac{\cos t}{\cos t} = \frac{1 - \cos^2 t}{\sin t \cos t} =$

$= \frac{\sin^2 t}{\sin t \cos t} = \frac{\sin t}{\cos t} = \tan t$

Homework for Test #1:

HW #1 - Submitted 8/15:

- 5.1 #1, 2, 7-18 all, 31-48 all, 55-74 all
- 4 angular speed problems on handout

HW #2 - Due Friday 8/22:

- 5.2 #1-75odd
- 5.3 #1-35odd; 37-48all; 61-68all
- 5.4 #1-22 all;
- 5.4 #33-67odd; 71-97odd

Due Monday 8/25:

- Test #1 Practice Problems (handout)

Test #1 - Wednesday, 8/27

Quiz #2 - This Friday, 8/22