Solving Sinusoidal Functions

KNOW	**DO**	**UNDERSTAND**
There are multiple solutions to a trig equation.	Can find the solutions to a trig equation in a given domain. Can use special triangles when appropriate.	*Inverse:* Sine and cosine are not 1-to-1 so the domain must be restricted. Restrictions come so that they take on all values of the range once.

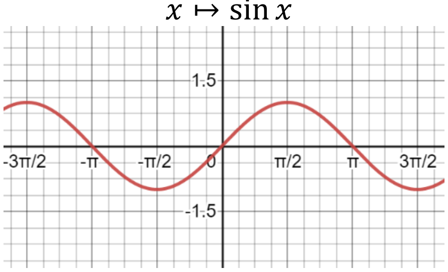
Vocab & Notation

- $\arcsin x$, $\arccos x$, $\arctan x$

Note how the domain gets restricted for the inverse functions:

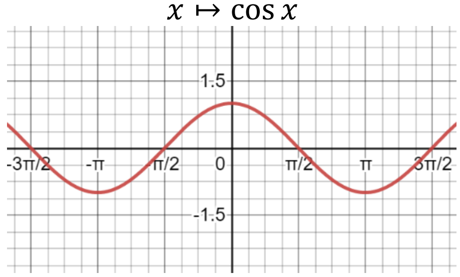
$f: \mathbb{R} \to [-1, 1]$

$x \mapsto \sin x$



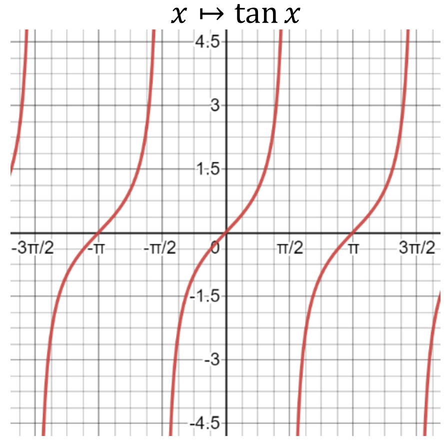
$g: \mathbb{R} \to [-1, 1]$

$x \mapsto \cos x$



$h: \mathbb{R} \backslash \{x \mid \cos x = 0\} \to \mathbb{R}$

$x \mapsto \tan x$



Example:	**Example**:	**Example**:
$\sin x = 0.8$	$\cos x = 0.8$	$\tan x = 0.8$

Example (With Calculator) Use algebra to solve the following trig equations:

$$\frac{1}{2}\sin(\pi(x-0.1)\,) = 0.2$$

Example (Without Calculator)

$$\left(\tan^2\left(\frac{1}{2}\left(x+\frac{\pi}{3}\right)\right)-1\right)\left(2\cos\left(\frac{x}{3}\right)+1\right)=0$$

Practice:

$$2\sin^2 x - 3\sin x + 1 = 0$$

$$2\cos\left(\frac{\pi}{5}(x-3)\right) + 1 = 0.5$$

$$\tan^2 2x + 4\tan 2x - 5 = 0$$

$$4\cos^3\left(\frac{\pi}{4}(x+1)\right) = 3\cos\left(\frac{\pi}{4}(x+1)\right)$$

$$\csc^2\left(\frac{3}{5}\left(x-\frac{\pi}{2}\right)\right)=4$$

$$\sec^2\left(\frac{\pi}{12}(x+3)\right)=2$$

$$\frac{2}{3}\sec\left(\frac{\pi}{5x}\right) = 1$$

$$5\cot\left(\frac{x^2}{6}\right) - 3 = 0$$

Practice Problems: Zeros of the practice graphing sheet (when available)