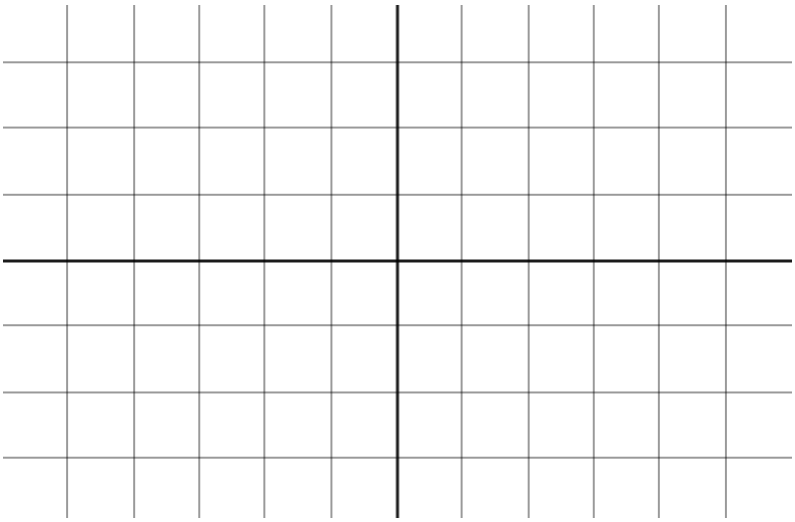
Graphing Sine and Cosine

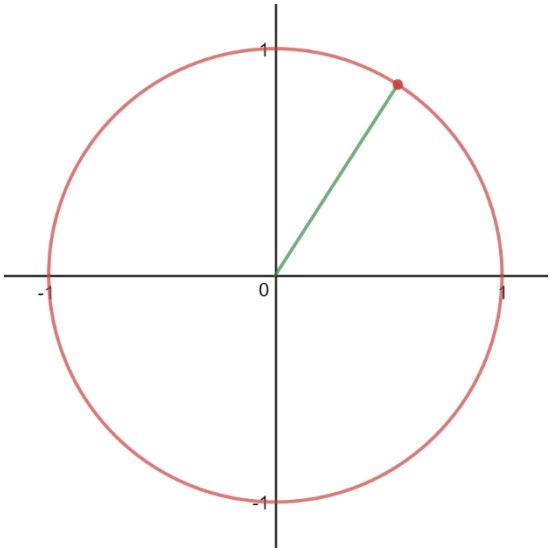
KNOW	DO	UNDERSTAND
How to identify the amplitude and period of a trig function. What a sinusoidal function looks like.	Can graph a trig function from the equation or characteristics accurately. Can build the equation of a trig function from the graph or characteristics accurately.	*Transformation:* Can explain how certain characteristics are or are not affected by a transformation. *Function Characteristics:* How the amplitude relates to the max/min values, midline as the average, period as the frequency, and shift as the start.

Vocab & Notation

- Amplitude
- Period
- Midline
- Phase Shift
- Sinusoidal function

Using a unit circle, graph the angle θ and the values of $\sin\theta$ and $\cos\theta$.





Definition: Functions that repeat after a certain amount of time are called **periodic functions** (periodic meaning occurring at regular intervals). Periodic functions that have this regular "wave" shape are called **sinusoidal functions**.

We want to analyze this curve so that we can graph functions of the form:

$$a \cdot \sin\big(b(x-c)\big) + d$$

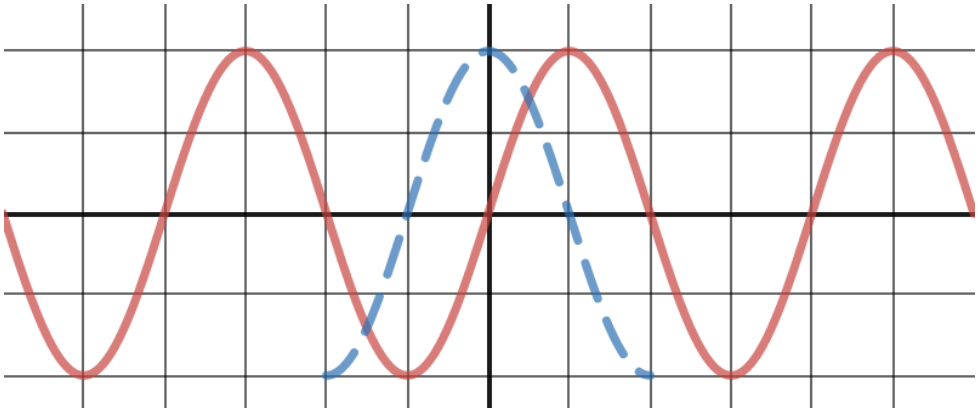
Definition: The **midline** is the average value of the function.

Definition: The **amplitude** is the distance from the midline to the maximum or minimum, or equivalently, half the distance between the max and min.

Definition: The **period** is the length of one complete cycle of a periodic function. Not necessarily how long it takes to repeat itself, but how long it takes to repeat the pattern.

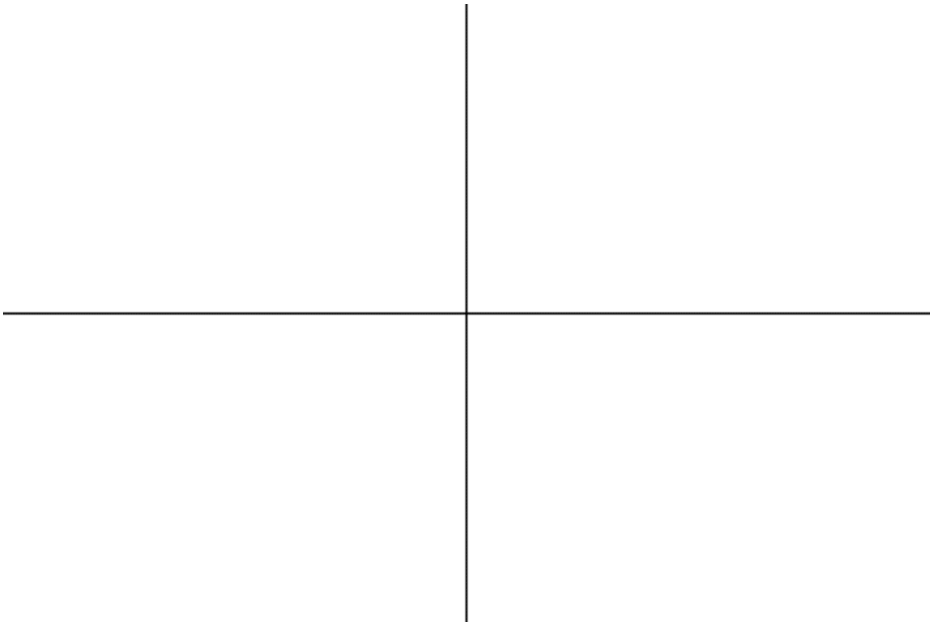
Definition: The **phase shift** is where the starting point of $\theta = 0$ got moved to.

When transforming a new function, we need to understand the basic function well to start.

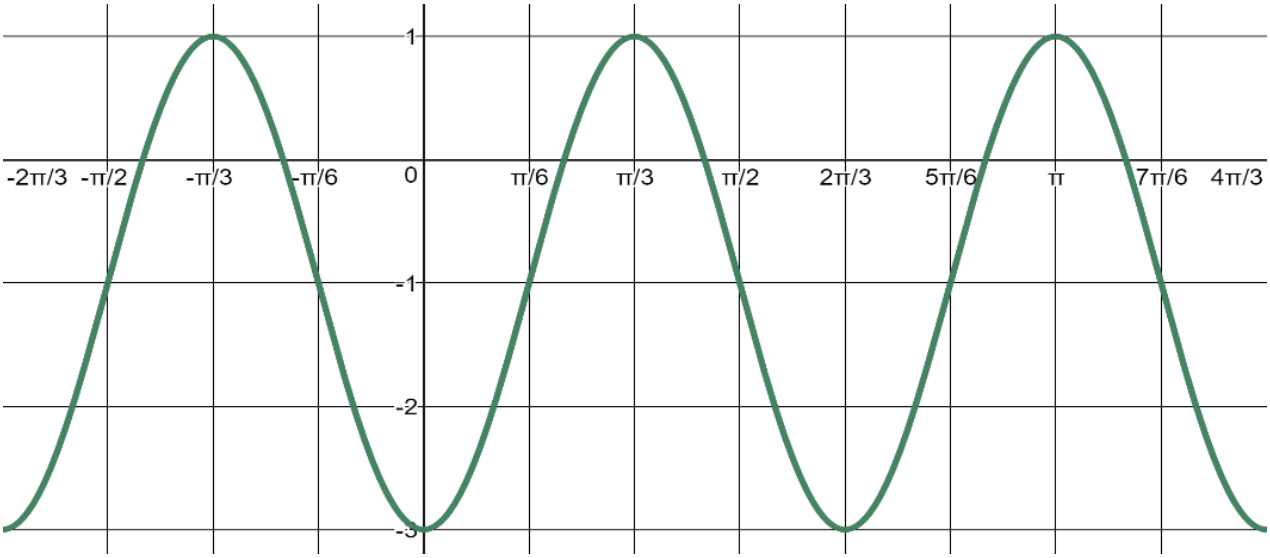


Example: Graph $f(\theta) = 3\sin\left(\frac{1}{2}\left(\theta - \frac{\pi}{4}\right)\right) + 1$

- Identify the midline from the vertical displacement
- Use the amplitude to find the max and min lines
- Use the phase shift to identify the starting point
- Split the period into quarters.



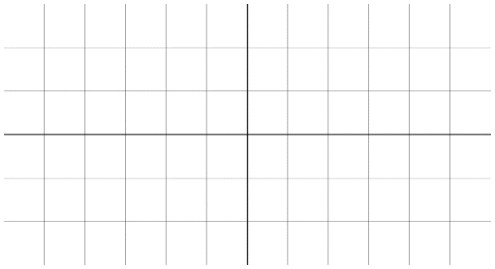
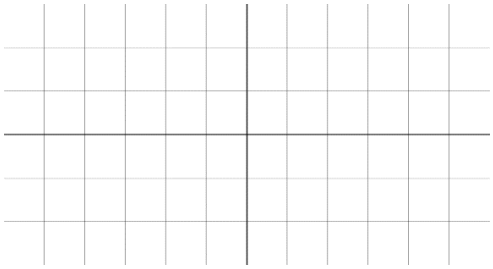
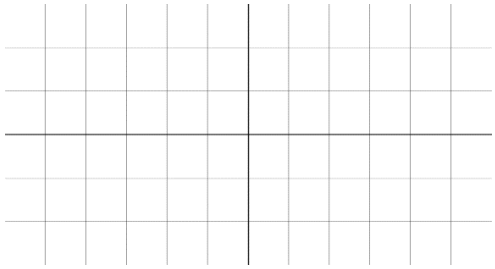
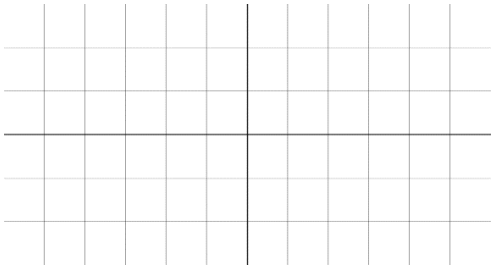
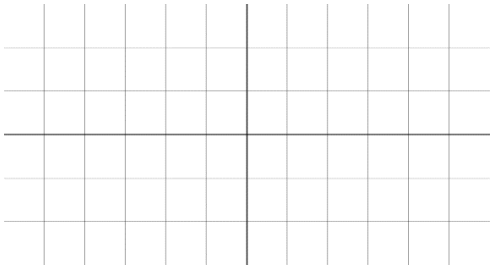
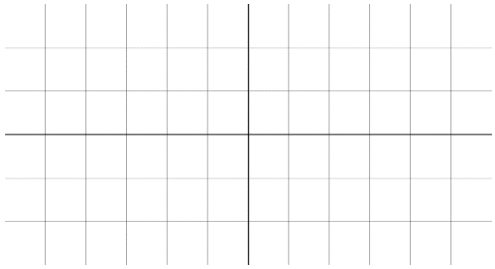
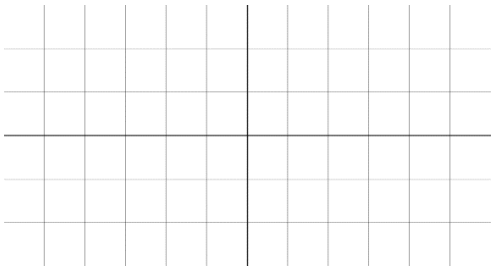
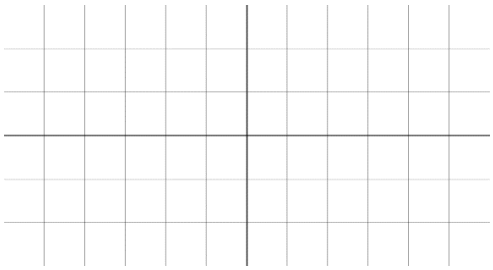
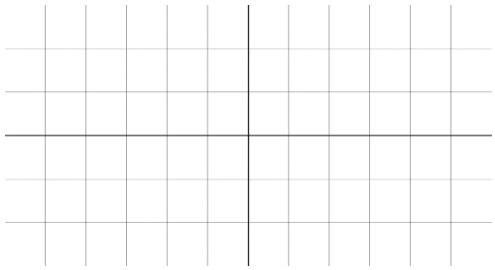
Example: Determine 3 different equations that could describe the following function.



Example: Determine two equations (one sine, one cosine) that could describe a sinusoidal function that has two minimums at $(-1, -3)$ and $(3, -3)$ and has an amplitude of 0.5.

Practice Problems: 5.1 page 233 – 236 # 1-12, 20-22
5.2 page 250 – 254 # 1-7, 10-19

Trig Graphs

$\sin x$  Domain: Range:	$\csc x$  Domain: Range:	$\arcsin x = \sin^{-1} x$  Domain: Range:
$\cos x$  Domain: Range:	$\sec x$  Domain: Range:	$\arccos x = \cos^{-1} x$  Domain: Range:
$\tan x$  Domain: Range:	$\cot x$  Domain: Range:	$\arctan x = \tan^{-1} x$  Domain: Range: