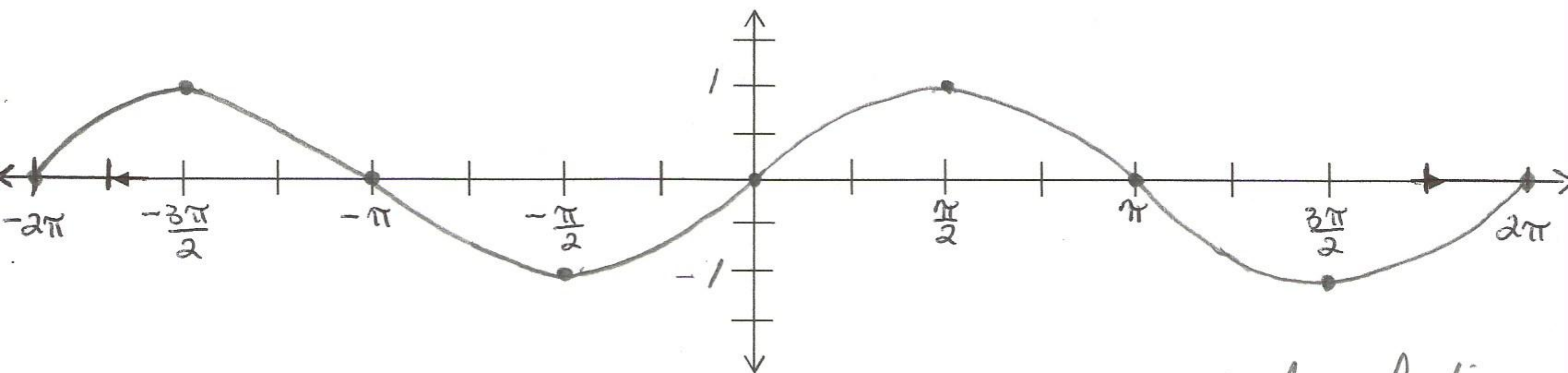
Graphing Sine & Cosine

Consider the function $y = \sin x$

x	-2π	$\frac{-7\pi}{4}$	$\frac{-3\pi}{2}$	$\frac{-5\pi}{4}$	$-\pi$	$\frac{-3\pi}{4}$	$\frac{-\pi}{2}$	$\frac{-\pi}{4}$	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	π	$\frac{5\pi}{4}$	$\frac{3\pi}{2}$	$\frac{7\pi}{4}$	2π
$\sin x$ (y)	0	$\frac{\sqrt{2}}{2}$	1	$\frac{\sqrt{2}}{2}$	0	$-\frac{\sqrt{2}}{2}$	-1	$-\frac{\sqrt{2}}{2}$	0	$\frac{\sqrt{2}}{2}$	1	$\frac{\sqrt{2}}{2}$	0	$-\frac{\sqrt{2}}{2}$	-1	$-\frac{\sqrt{2}}{2}$	0

Given input of x, you get output of $\sin x$ (y)



* period of a function is a cycle for how long it takes for graph to repeat *

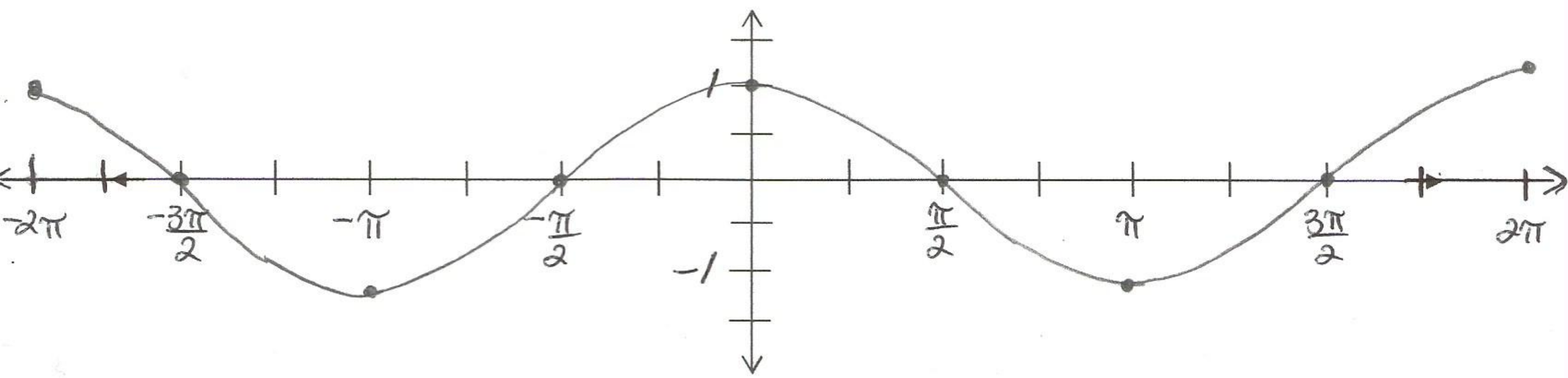
Properties of the graph of $y = \sin x$

1. *period is 2π
2. Domain is all real #'s or $\mathbb{R}$
3. Range is $[-1, 1]$ inclusive
4. x-intercepts $(y=0)$ is at πn, where n is an integer
5. y-intercept is 0 (crosses y axis)
6. max values $(y=1)$ when $x = \frac{\pi}{2} + 2\pi n$, n is integer
7. min values $(y=-1)$ when $x = \frac{3\pi}{2} + 2\pi n$, n is integer

Graphing Sine & Cosine

Consider the function *y = cos x*

x	-2π	$\frac{-7\pi}{4}$	$\frac{-3\pi}{2}$	$\frac{-5\pi}{4}$	$-\pi$	$\frac{-3\pi}{4}$	$\frac{-\pi}{2}$	$\frac{-\pi}{4}$	0	$\frac{\pi}{4}$	$\frac{\pi}{2}$	$\frac{3\pi}{4}$	π	$\frac{5\pi}{4}$	$\frac{3\pi}{2}$	$\frac{7\pi}{4}$	2π
$\cos x$	1	$\frac{\sqrt{2}}{2}$	0	$\frac{-\sqrt{2}}{2}$	-1	$\frac{-\sqrt{2}}{2}$	0	$\frac{\sqrt{2}}{2}$	1	$\frac{\sqrt{2}}{2}$	0	$\frac{-\sqrt{2}}{2}$	1	$\frac{-\sqrt{2}}{2}$	0	$\frac{\sqrt{2}}{2}$	1



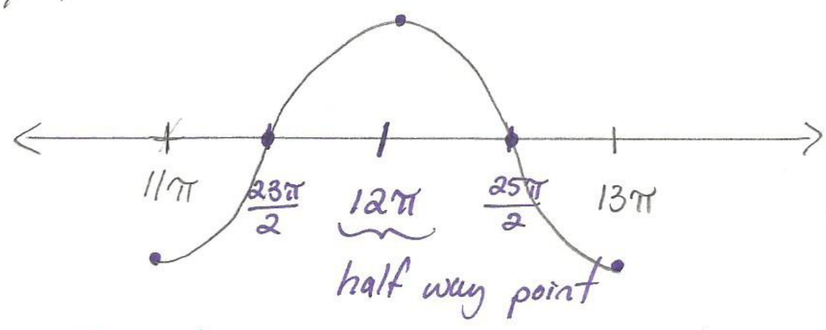
Properties of the graph of $y = \cos x$

1. period is 2π
2. Domain is $\mathbb{R}$
3. Range is $[-1, 1]$ inclusive
4. x-intercepts ($y=0$) at $\frac{\pi}{2} + \pi n$, n is integer
5. y-intercept is 1
6. max value $y=1$ at $x = \pi n$, n is even integer
7. min value $y=-1$ at $x = \pi n$, n is odd integer

Graphing Sine & Cosine

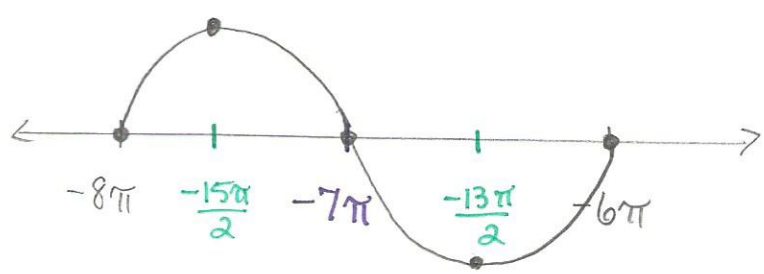
using the properties, we can graph sin & cos in different intervals.

Example: graph cos x between $11\pi < x < 13\pi$



* odd π for cos $= -1$
* even π for cos $= 1$
* at $\frac{\pi}{2}$ values cos $= 0$

Example: graph sin x between $-8\pi < x < -6\pi$



* since $\frac{-15\pi}{2} \Rightarrow 1$ then $\frac{-13\pi}{2} \Rightarrow -1$

* for sin πn values $= 0$
* for $\frac{\pi}{2}$ values, you must determine if it is a cycle of $\frac{\pi}{2}$ or $\frac{3\pi}{2}$

* take -15 & add 4 until you get 1 or 3.

$-15+4=-11+4=-7+4=-3+4=\boxed{1}$ $\therefore$ $\frac{-15\pi}{2}$ is a $\frac{\pi}{2}$ cycle which $= 1$

Using the Properties of Sine & Cosine Graphs

I. Evaluating for sine & cosine functions

① $\cos 10\pi \Rightarrow$ since even π $\Rightarrow \cos 10\pi = 1$

② $\sin -13\pi \Rightarrow$ at values of π, $\sin x = 0$ $\therefore \sin -13\pi = 0$

③ $\cos \frac{15\pi}{2} \Rightarrow$ at values of $\frac{\pi}{2}$, $\cos x = 0$ $\therefore \cos \frac{15\pi}{2} = 0$

④ $\sin \frac{15\pi}{2} \Rightarrow$ which $\frac{\pi}{2}$ values, $\sin = 1$ or -1,
you must determine if the value is
a cycle of $\frac{\pi}{2}$ or $\frac{3\pi}{2}$

* take 15 & subtract 4 until you get 1 or 3

$15-4=11-4=7-4=\boxed{3}$

* since it goes to 3, means a cycle of $\frac{3\pi}{2}$

$\therefore \sin \frac{3\pi}{2} = -1$ then $\sin \frac{15\pi}{2} = -1$

II For what values of x is the equation true?

① $\cos x = -1$ @ odd π

② $\sin x = 0$ @ πn

③ $\sin x = -1$

@ $\frac{3\pi}{2} + 2\pi n$

④ $\cos x = 0$ @ $\frac{\pi}{2} + \pi n$

* based off of the properties