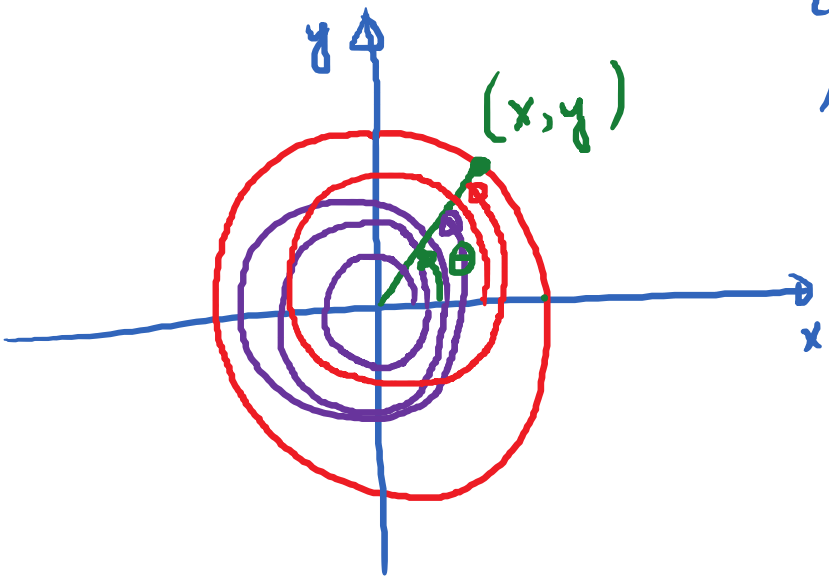
4.1. Graphs of Sine and Cosine Function

Tuesday, October 10, 2017 1:22 PM

Obj 1: Periodic Functions



$\cos\theta = x$

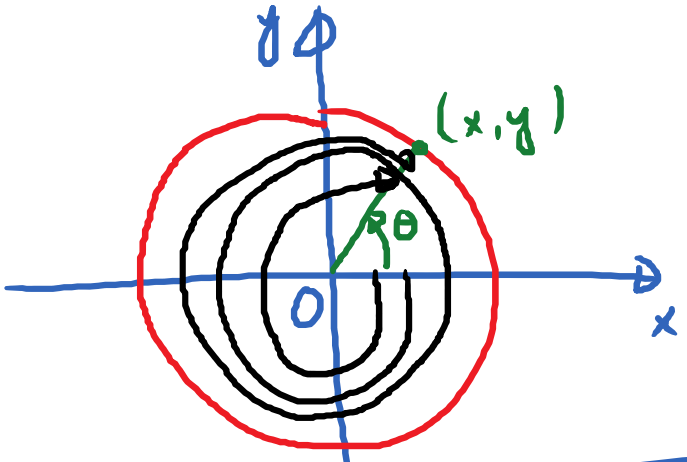
$\sin\theta = y$

$\sin(\theta + 2\pi) = y$

$\cos(\theta + 2\pi) = x$

$\sin(\theta + 3\cdot 2\pi) = y$

$\cos(\theta + 3\cdot 2\pi) = x$



$\cos(\theta - 2\pi) = x$

$\sin(\theta - 2\pi) = y$

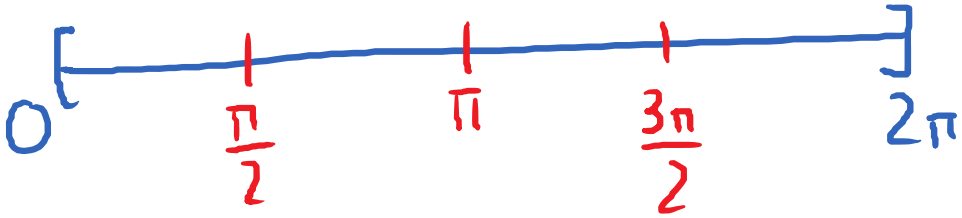
$$\sin(\theta + n\cdot 2\pi) = \sin\theta = y$$

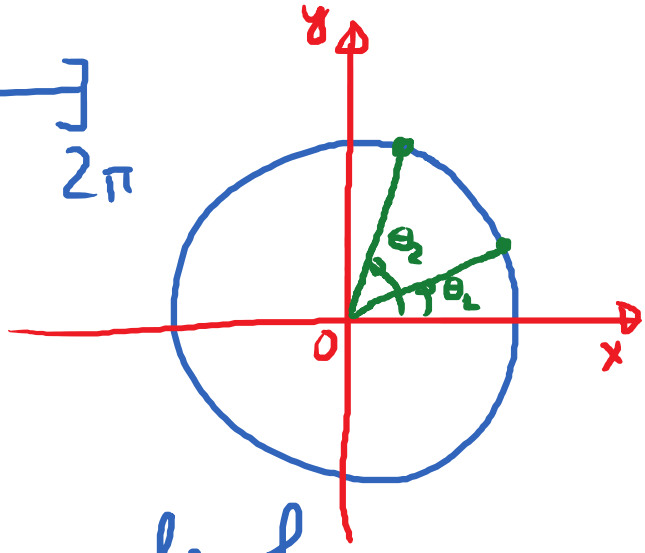
$$\cos(\theta + n\cdot 2\pi) = \cos\theta = x$$

Sine and Cosine functions are called periodic functions

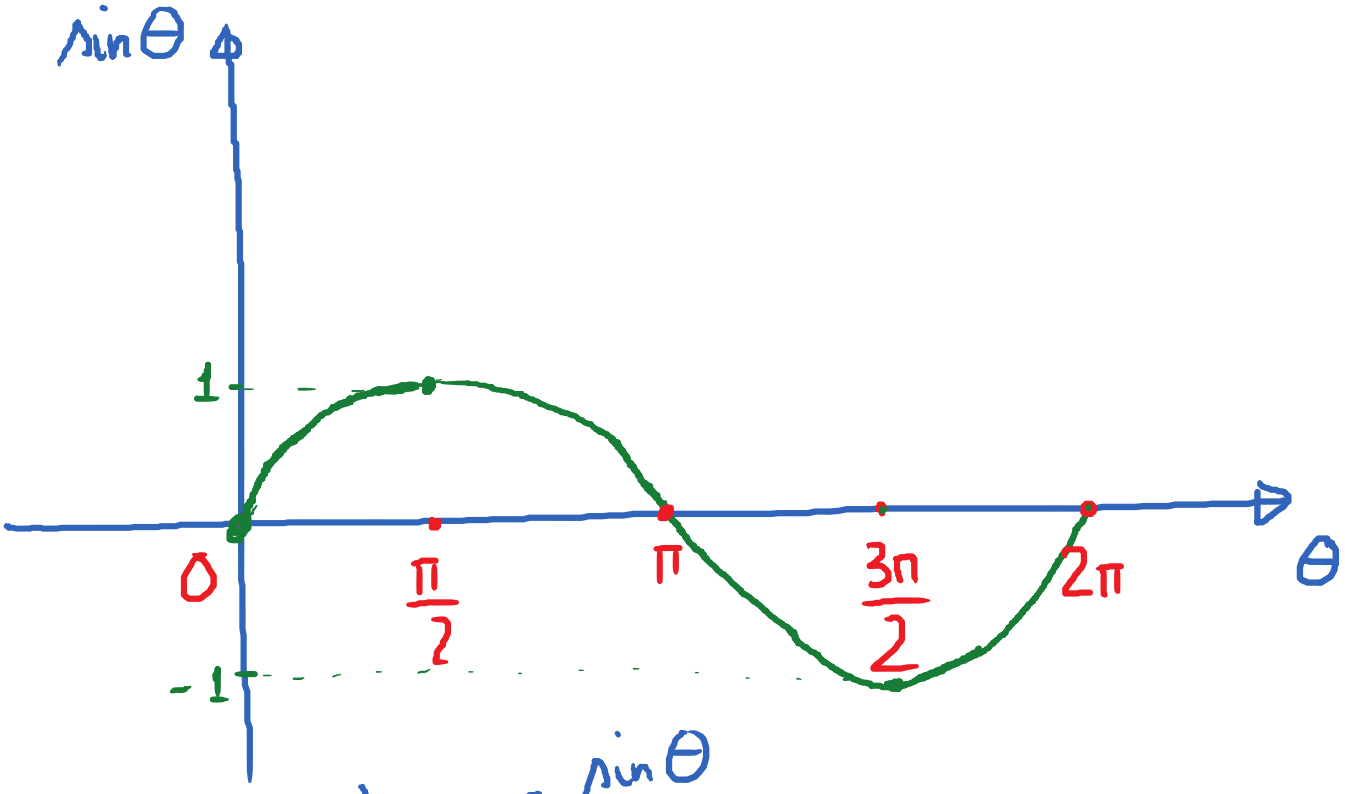
Behavior of sine and cosine on $[0, 2\pi]$

θ	$\sin\theta$	$\cos\theta$
0 to $\frac{\pi}{2}$	Increasing	Decreasing
$\frac{\pi}{2}$ to π	Decreasing	Decreasing
π to $\frac{3\pi}{2}$	Decreasing	Increasing
$\frac{3\pi}{2}$ to 2π	Increasing	Increasing

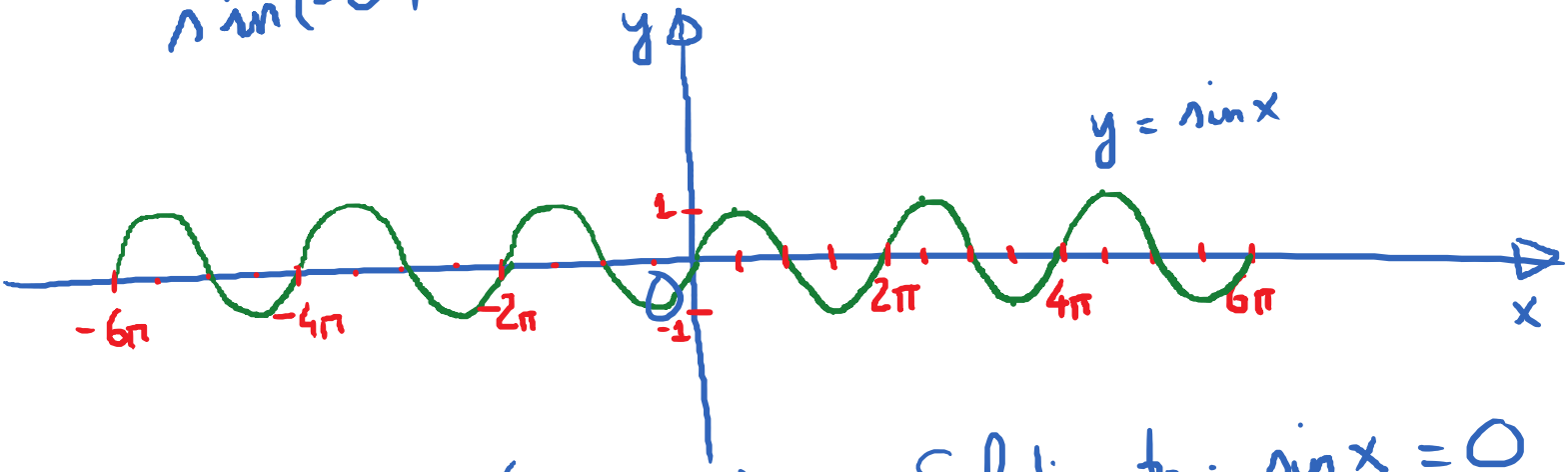




Obj 3: Rough Sketch of graphs of sine & cosine functions on $[0, 2\pi]$.



$\sin(-\theta) = -\sin\theta$



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

Solution to: $\sin x = 0$

Range: $[-1, 1]$.

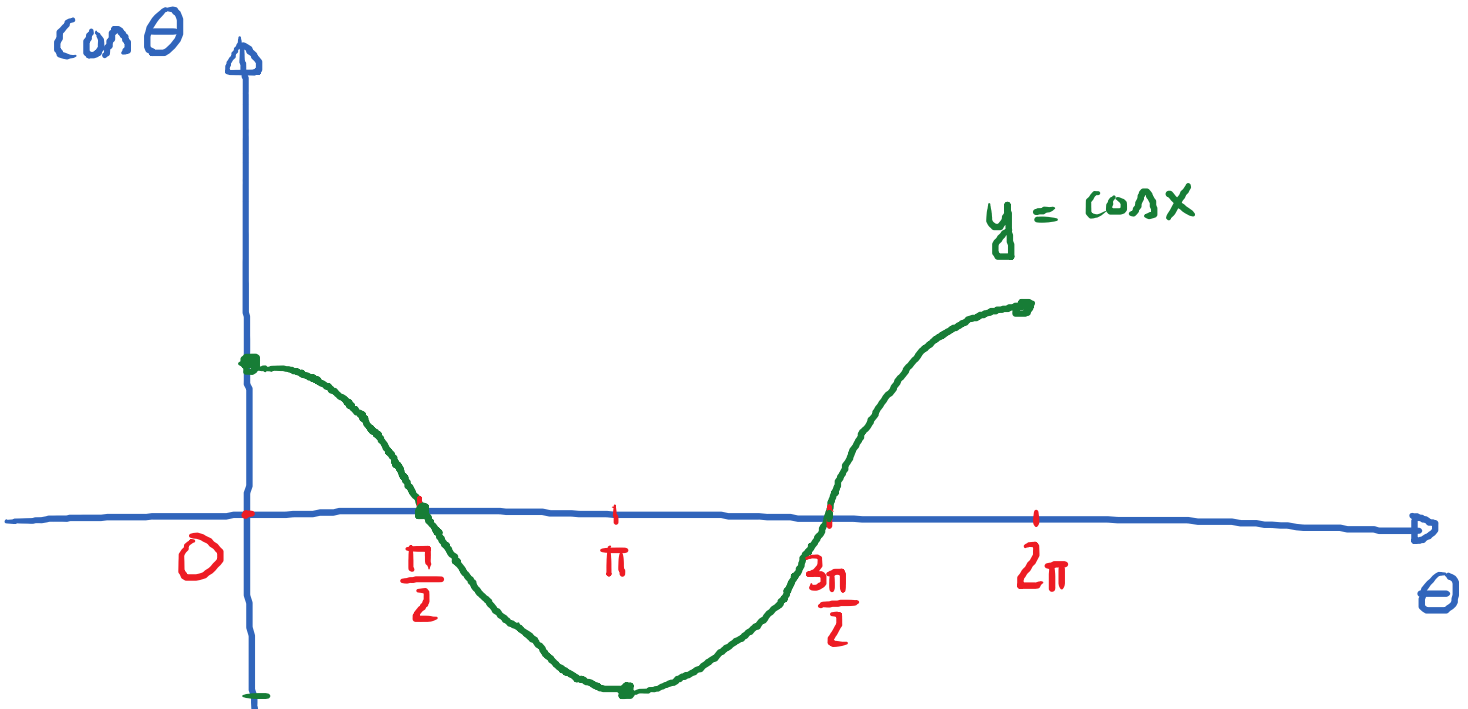
x-intercepts of sine function: $x = n\pi$

(x-part:)

n is any integer.

Cosine:

1. Graph on $[0, 2\pi]$
2. Extend the graph to $[-6\pi, 6\pi]$
3. Domain, Range, x-intercepts.

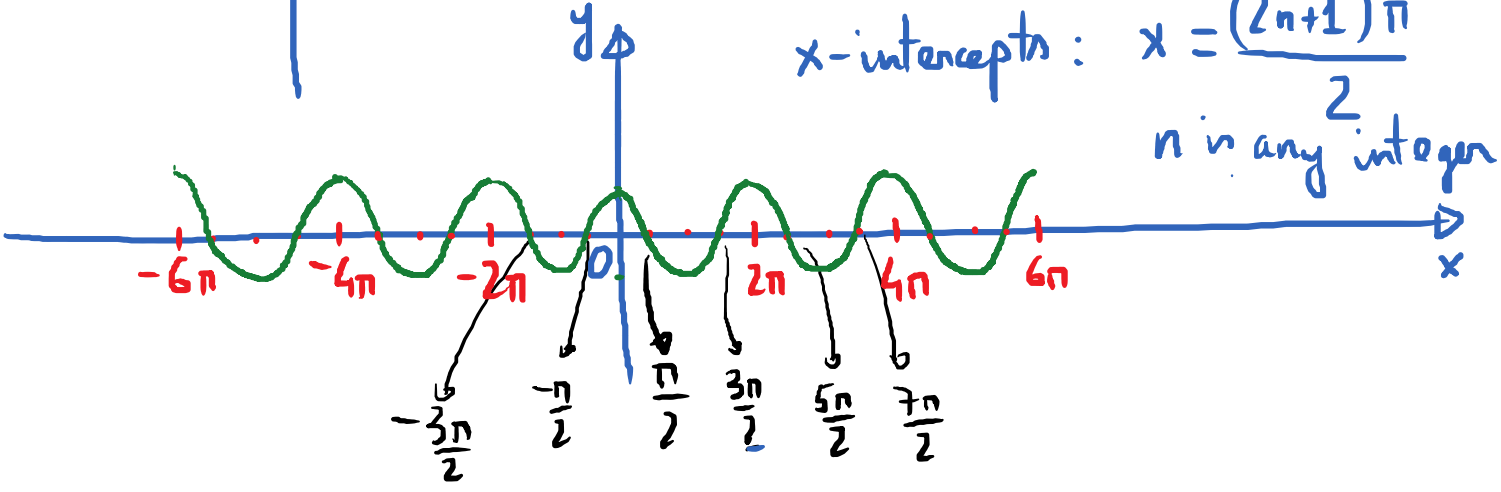


Range: $[-1, 1]$

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

x-intercepts: $x = \frac{(2n+1)\pi}{2}$

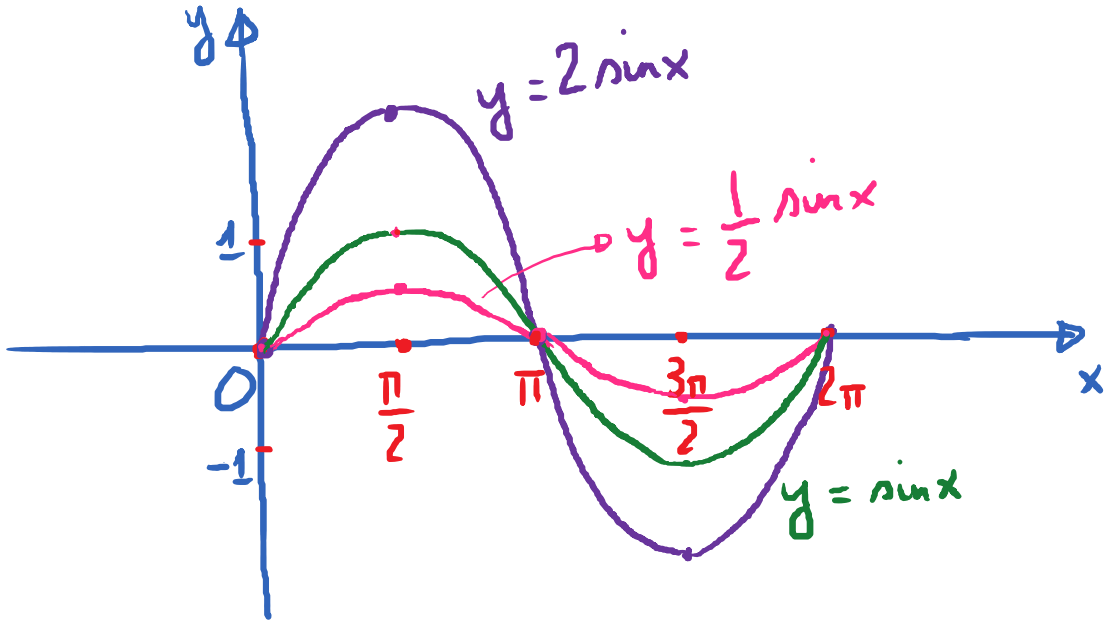
n is any integer



$\cos(-x) = \cos x$ for any real # x.

(from graph or unit circle)

Graphs of functions of the form $y = a \sin x$



$y = 2 \sin x$

Key points of $y = \sin x$

x	$y = \sin x$
0	0
$\frac{\pi}{2}$	1
π	0
$\frac{3\pi}{2}$	-1
2π	0

x	$y = 2 \sin x$
0	0
$\frac{\pi}{2}$	2
π	0
$\frac{3\pi}{2}$	-2
2π	0