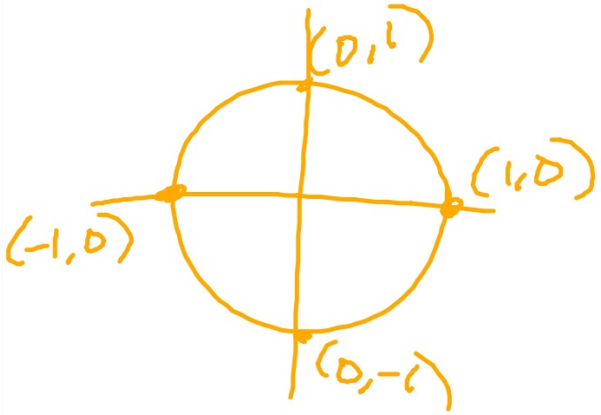
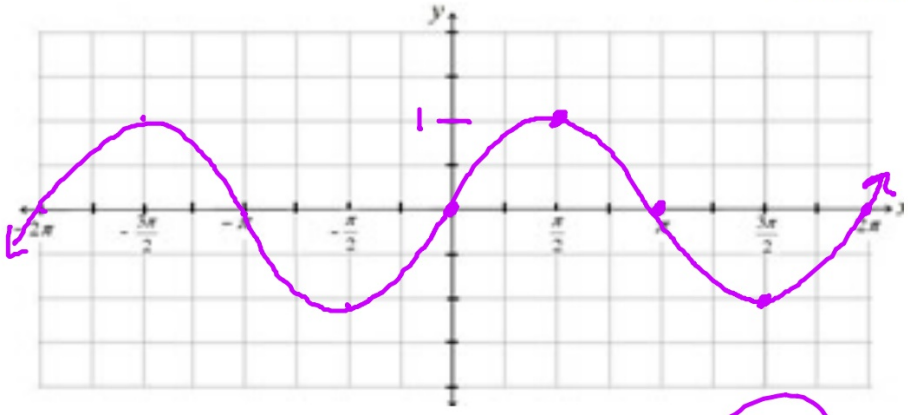
10.1 Graphing Sine and Cosine Functions

We can use the unit circle to graph y = sinx and y = cosx



$y = \sin x$

Period: 2π



Even, Odd, or Neither

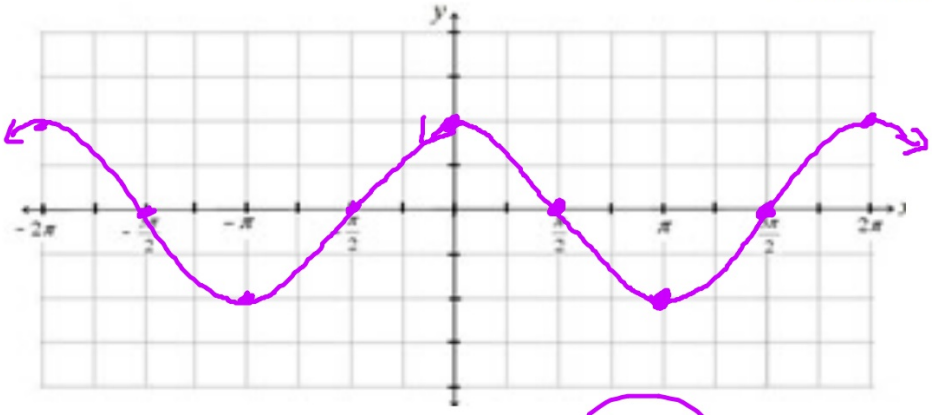
Domain: $\{x \mid x \in R\}$

Range: $\{y \mid -1 \leq y \leq 1\}$

Symmetrical with: origin

$y = \cos x$

Period: 2π



Even, Odd, or Neither

Domain: $\{x \mid x \in R\}$

Range: $\{y \mid -1 \leq y \leq 1\}$

Symmetrical with: y-axis

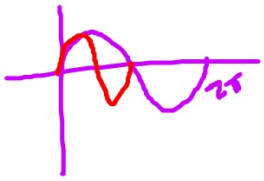
Transformations $y = 3\sin 2x - 1$

$y = a\sin b(x - c) + d$ or $y = a\cos b(x - c) + d$

a: Amplitude $|a|$ 3

b: This value determines the period of the function

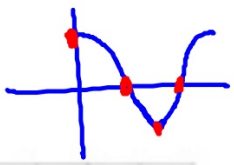
period = $2\pi/b$ $\frac{2\pi}{2} = \pi$



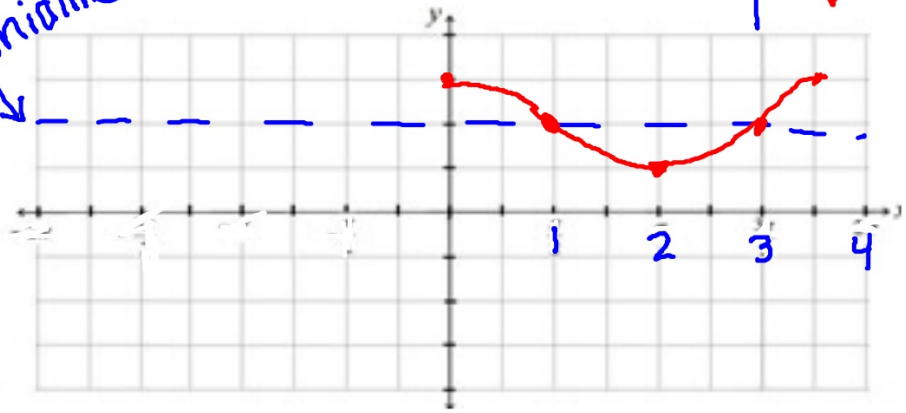
c: phase shift (aka horizontal translation)

d: vertical shift down 1

#1 $y = \cos\frac{\pi}{2}x + 2$



midline



Amplitude 1

period $\frac{2\pi}{\frac{\pi}{2}} = 4$

increments $\frac{\text{period}}{4} = 1$

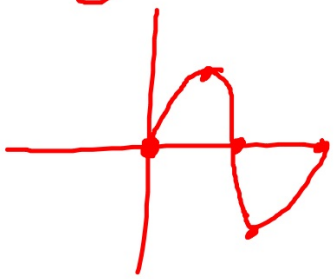
vertical shift

up 2

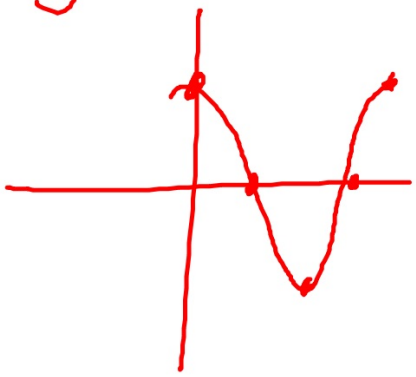
Domain $\{x | x \in R\}$

Range $\{y | 1 \le y \le 3\}$

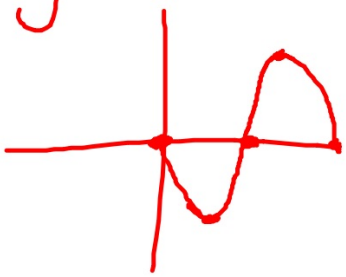
$y = \sin x$



$y = \cos x$



$y = -\sin x$



$y = -\cos x$

#2 $y = 2\sin 3x - 1$

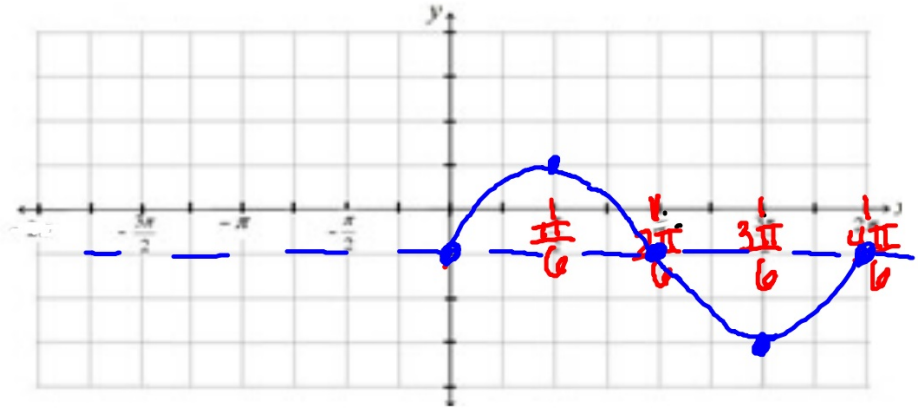
Amplitude 2

period $\frac{2\pi}{3}$

Increments $\frac{2\pi}{3} \div 4$

$\frac{\pi}{6}$

vertical shift ↓ 1

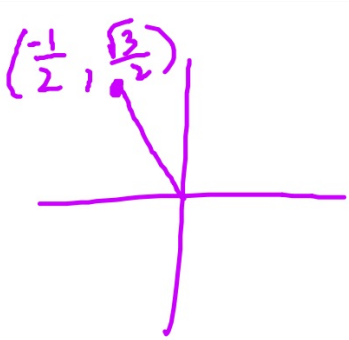


Domain $(-\infty, \infty)$

Range $[-3, 1]$

10 Q

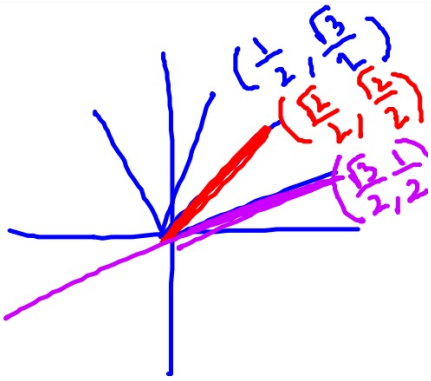
$\sin \frac{2\pi}{3} = \frac{\sqrt{3}}{2}$



$\tan 180^\circ = 0$

$\cos(-\frac{\pi}{4}) = \frac{\sqrt{2}}{2}$ +.

$\sec(\frac{7\pi}{6})_{III} = \frac{-2}{\sqrt{3}} = \frac{-2\sqrt{3}}{3}$



$\tan 210^\circ = \frac{+\frac{1}{2}}{+\frac{\sqrt{3}}{2}}$

$= \frac{\sqrt{3}}{3}$

$$y = a\sin(bx - c) + d$$

or

$$y = a\sin b(x - c) + d$$

How to find the phase shift

Horizontal translation
Phase shift (PS)

$bx - c = 0$	$b(x + c) = 0$
$y = 2\cos(2x - \pi) - 1$	$y = 3\sin 2(x + 8)$

$$y = \sin\left(x + \frac{\pi}{2}\right) + 1$$

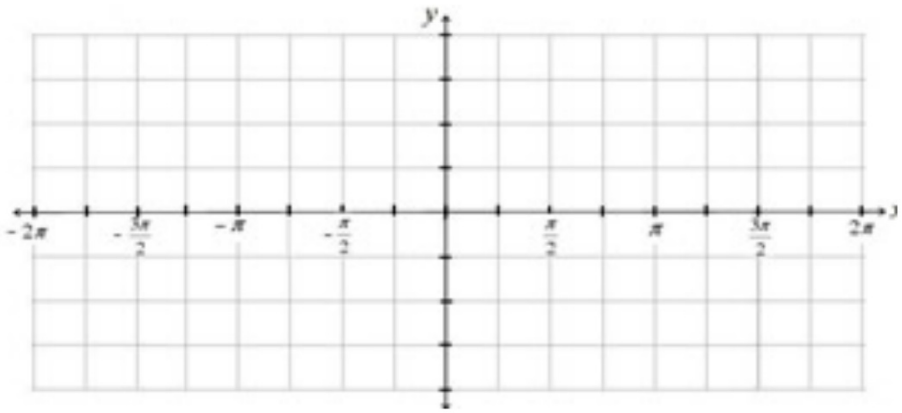
Amplitude

period

Increments

vertical shift

phase shift



Domain

Range