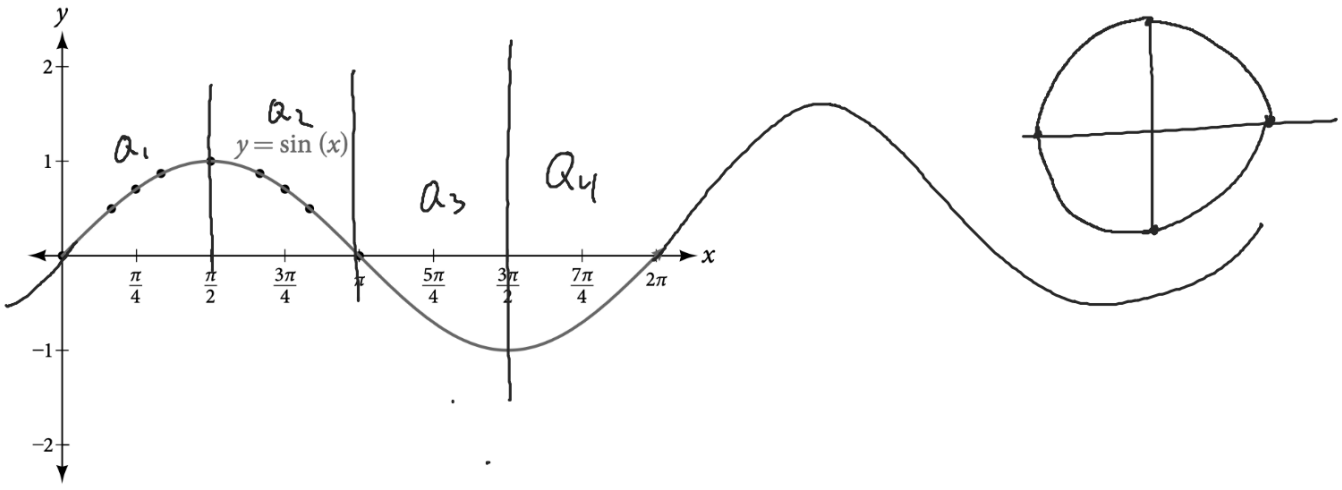
Open Stax 6.1

Graphs of Sine and Cosine Functions

The graph of $y = \sin x$

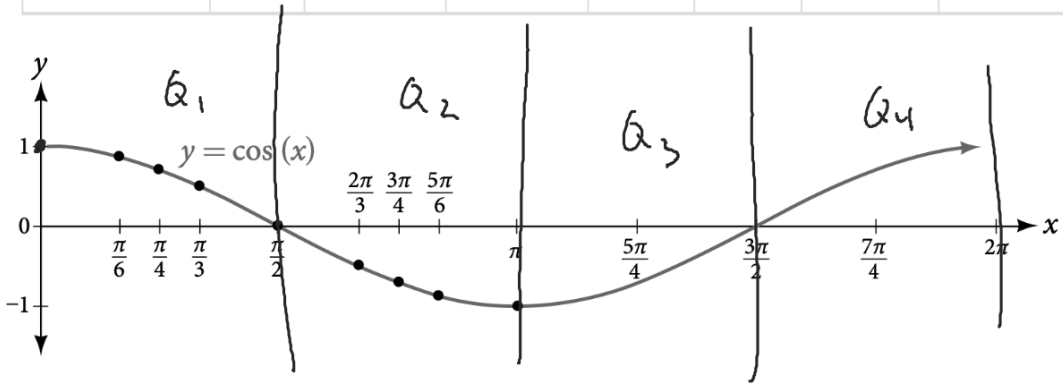
x	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	π
$\sin(x)$	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0

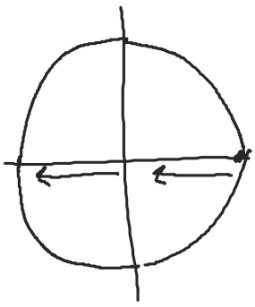
.707 .8660



The graph of y = cos x

x	0	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{3\pi}{4}$	$\frac{5\pi}{6}$	π
cos (x)	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{2}}{2}$	$-\frac{\sqrt{3}}{2}$	-1





Characteristics of sine and cosine functions

Periods $\rightarrow 2\pi$

Domain $(-\infty, \infty)$ Range $[-1, 1]$

$y = \sin x$

odd Function

Symetric about Origin

$y = \cos x$

Even Function

Symetric about y-axis

Sinusoidal Functions

$$y = A\sin B(x - C) + D \text{ or } y = A\sin(Bx - \frac{C}{B}) + D$$

$$y = A\cos B(x - C) + D \text{ or } y = A\cos(Bx - \frac{C}{B}) + D$$

Determining Amplitude

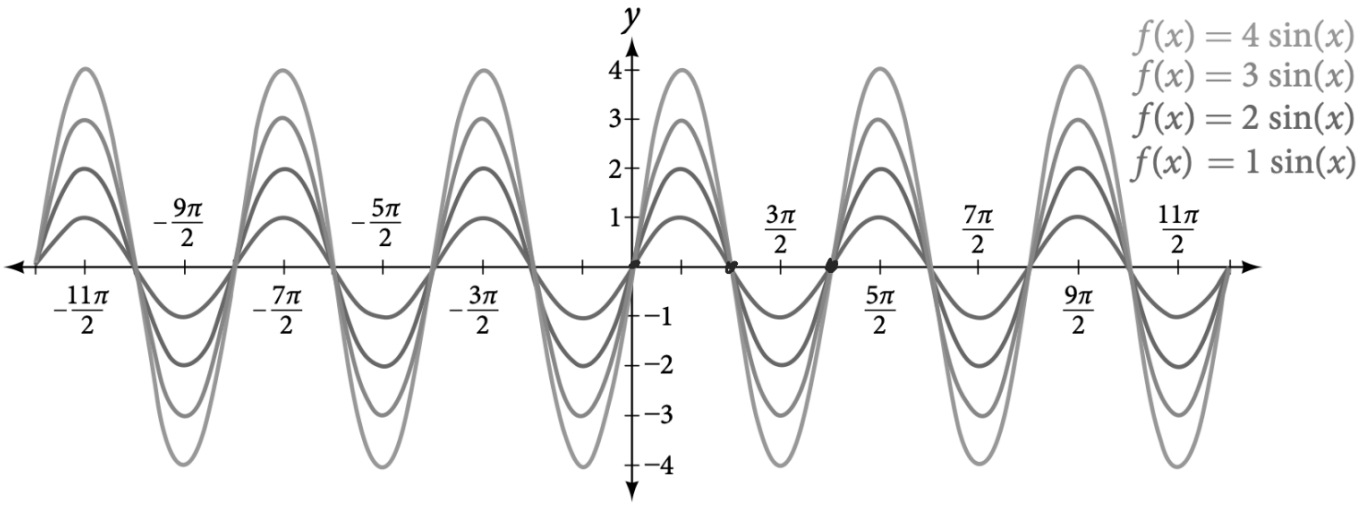
amplitude of sinusoidal functions

If we let $C = 0$ and $D = 0$ in the general form equations of the sine and cosine functions, we obtain the forms

$$y = A\sin(Bx) \text{ and } y = A\cos(Bx)$$

The **amplitude** is A, and the vertical height from the **midline** is $|A|$. In addition, notice in the example that

$$|A| = \text{amplitude} = \frac{1}{2}|\text{maximum} - \text{minimum}|$$

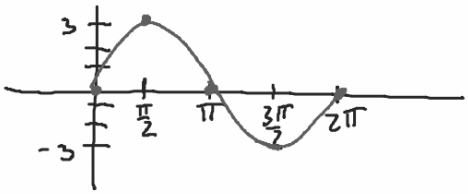


Find the amplitude for each function. Tell whether the function is vertically stretched or compressed. Graph the Function.

Negative in front of A
Reflection over x-axis

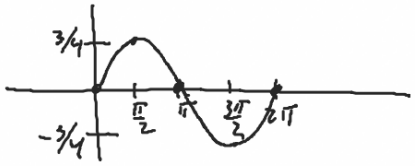
$y = 3\sin x$

A = 3 Vertical Stretch



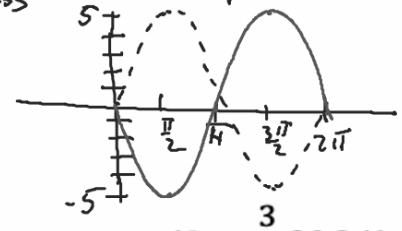
$y = \frac{3}{4}\sin x$

$A = \frac{3}{4}$ Vert Compress



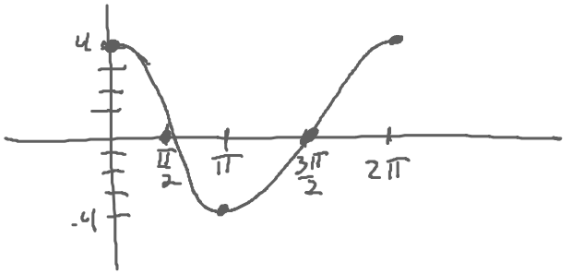
$y = -5\sin x$

Amp = 5 V.S.



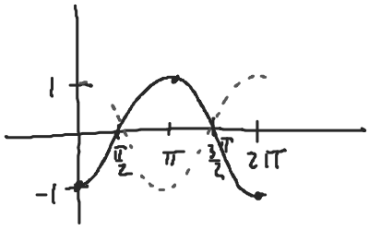
$y = 4\cos x$

A = 4 Vertical Stretch



$y = -\cos x$

A = 1 No V.S. V.C.



$y = \frac{3}{2}\cos x$

$A = \frac{3}{2}$ V.S.