

Graphing Sine and Cosine Functions Video Lecture

Sections 6.4 and 6.6

Course Learning Objectives:

Demonstrate an understanding of trigonometric functions and their applications.

Weekly Learning Objectives:

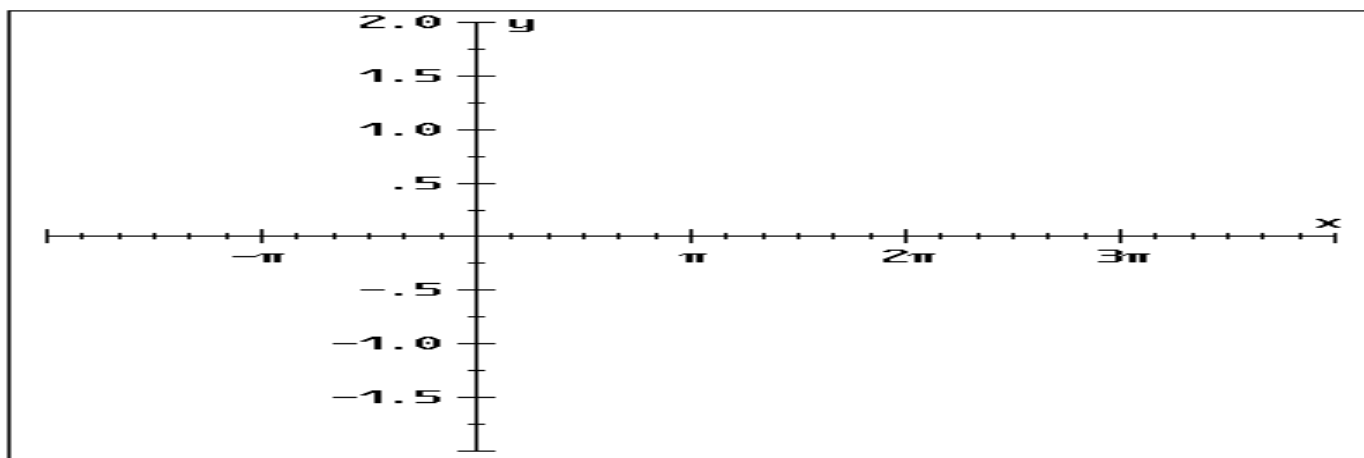
- 1) Graph functions of the form $y=a(\sin bx+c)+d$ using transformations.
- 2) Graph functions of the form $y=a(\cos bx+c)+d$ using transformations.
- 3) Determine the domain, range, amplitude, period, intercepts, extrema and symmetry of sinusoidal functions.
- 4) Graph sinusoidal functions using key points.
- 5) Find an equation for a sinusoidal graph.

Graphing the Sine and Cosine Functions

$$f(x) = \sin x$$

Note: $\sin(t + 2n\pi) = \sin t$ We say $\sin t$ has a period of 2π

x	$\sin x$	x	$\sin x$	x	$\sin x$	x	$\sin x$
0		$\frac{2\pi}{3}$		$\frac{7\pi}{6}$		$\frac{5\pi}{3}$	
$\frac{\pi}{6}$		$\frac{3\pi}{4}$		$\frac{5\pi}{4}$		$\frac{7\pi}{4}$	
$\frac{\pi}{3}$		$\frac{5\pi}{6}$		$\frac{4\pi}{3}$		$\frac{11\pi}{6}$	
$\frac{\pi}{2}$		π		$\frac{3\pi}{2}$		2π	



Domain:

Range:

Symmetry:

Period:

Intercepts:

Extrema

All previously discussed transformations apply to all trigonometric functions. The most general form of the equation is

$$f(x) = a \sin (bx + c) + d = a \sin b\left(x + \frac{c}{b}\right) + d$$

a → vertical stretch/compression (amplitude)

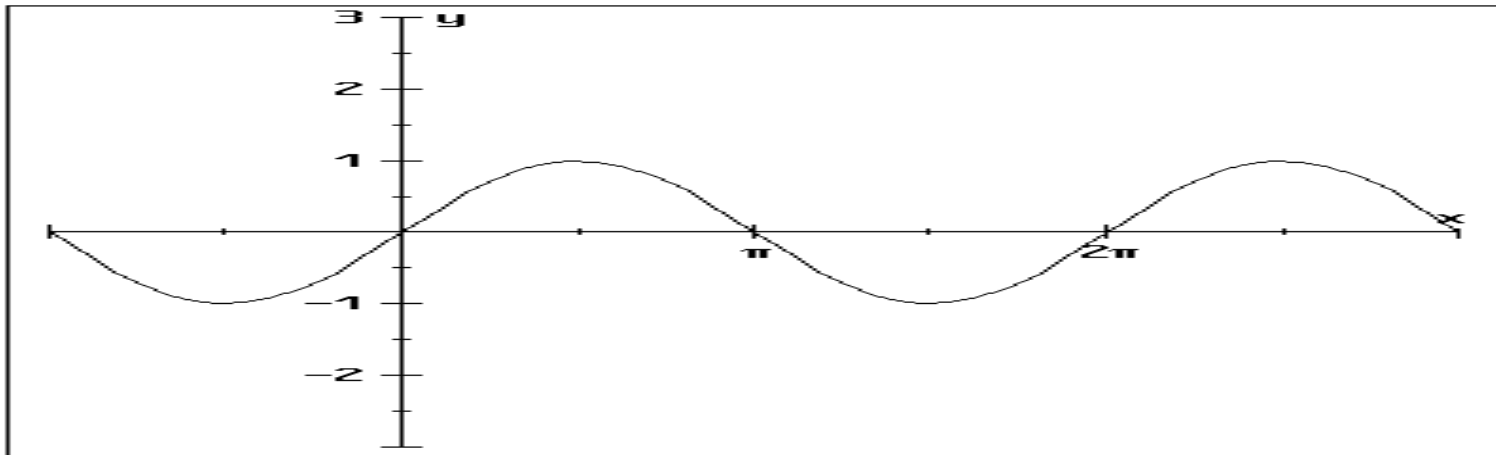
b → horizontal stretch/compression (period)

$\frac{c}{b}$ → horizontal translation (phase shift)

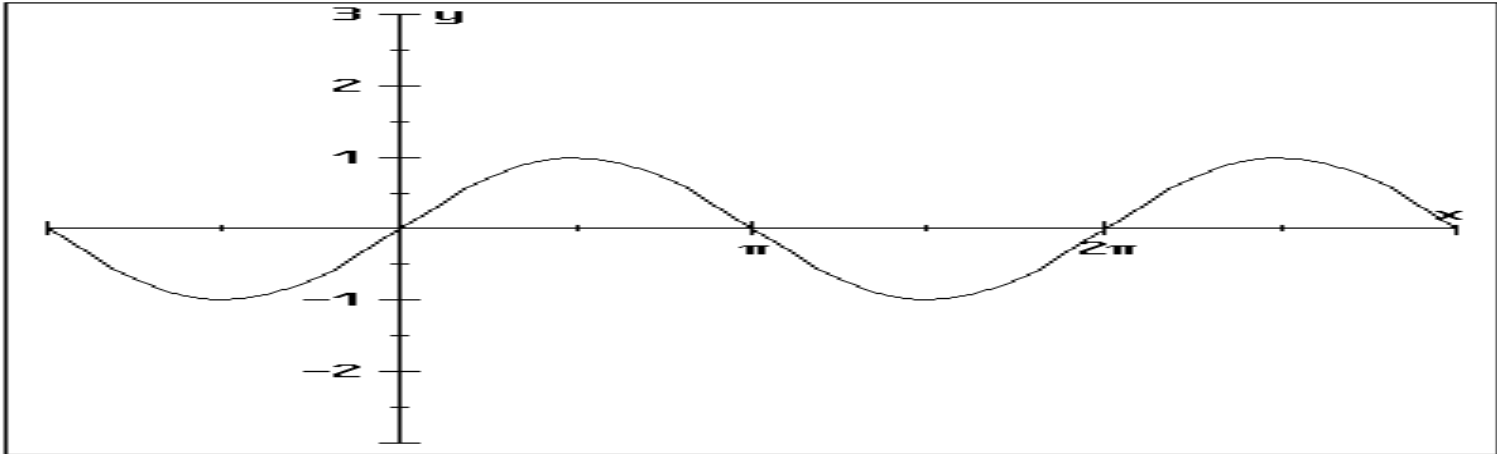
d → vertical translation

Indicate the transformations implied and sketch the graph of each of the following:

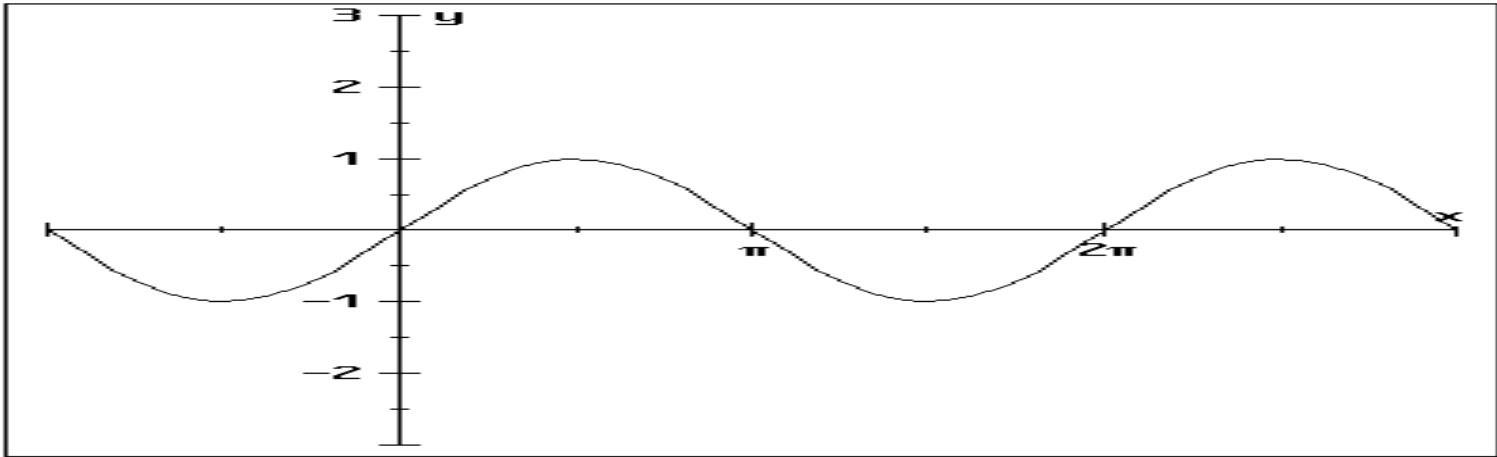
$$f(x) = 2 \sin x$$



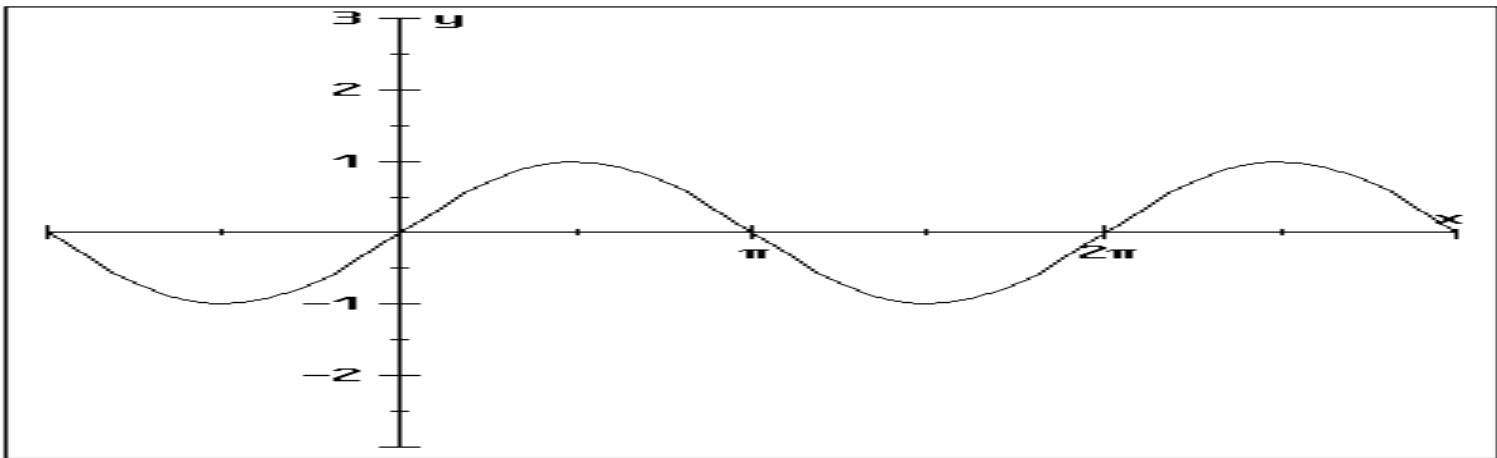
$$g(x) = \sin 2x$$



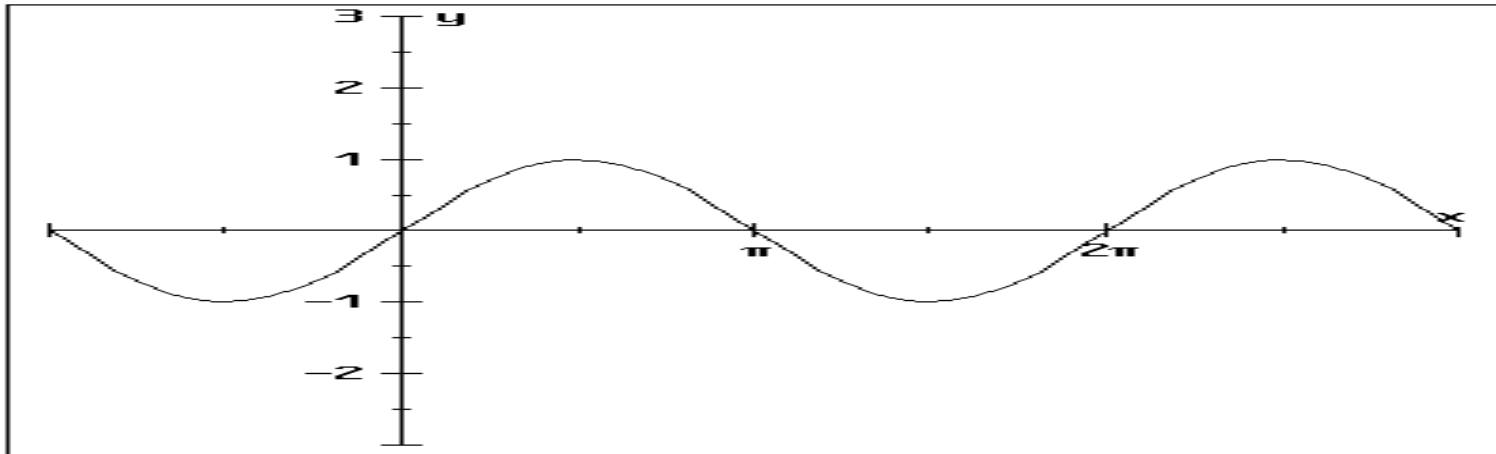
$$l(x) = -\sin x$$



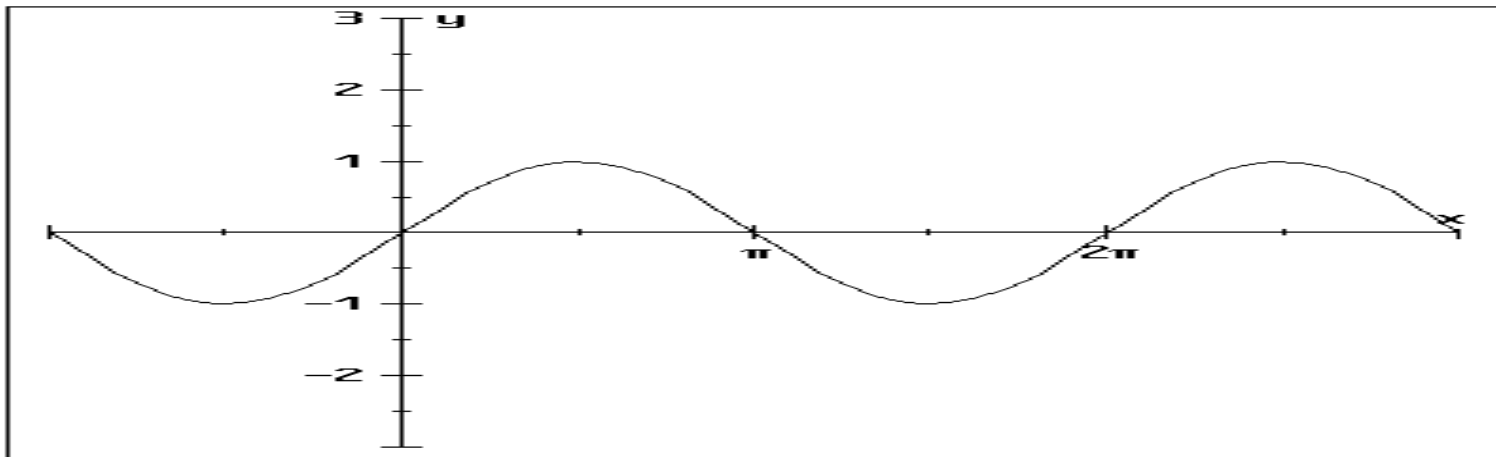
$$j(x) = 3 \sin \left(x - \frac{\pi}{4}\right)$$



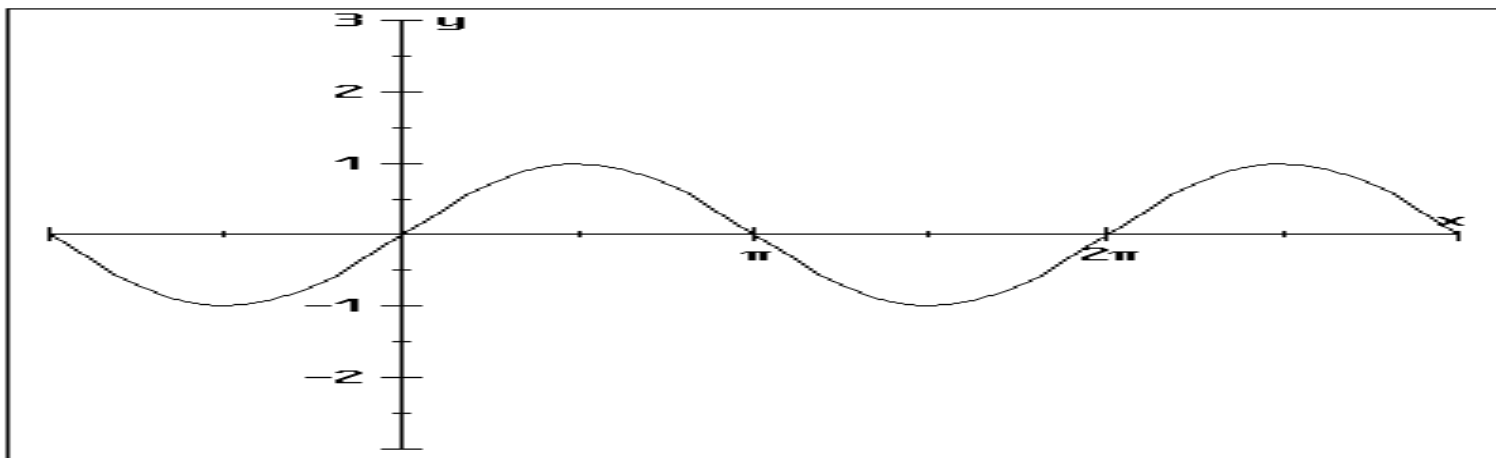
$$h(x) = \sin x + 2$$



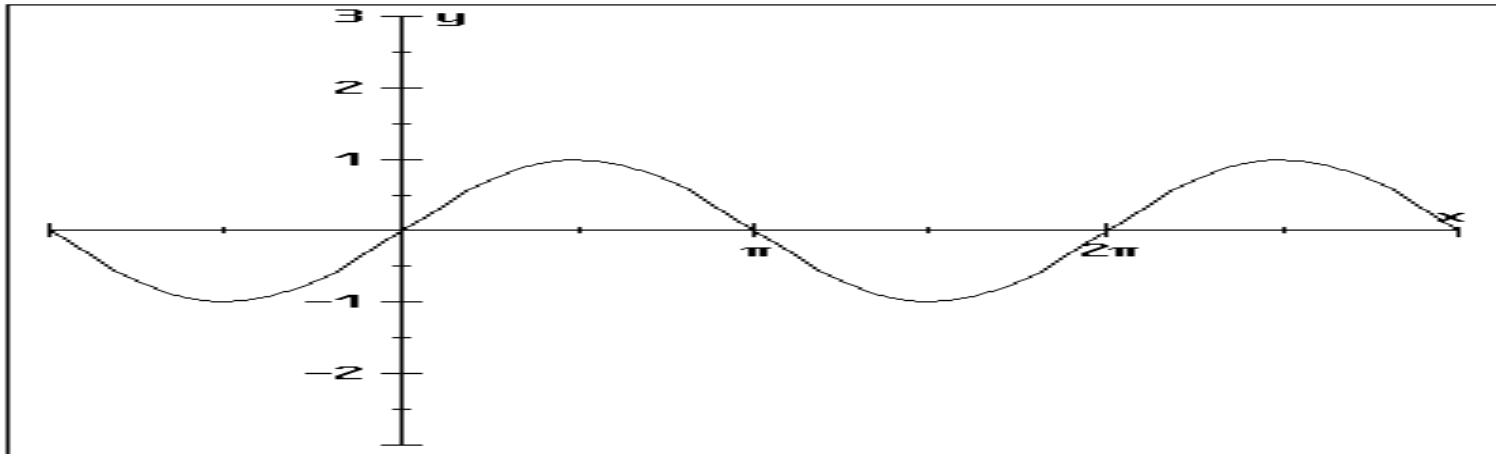
$$r(x) = \sin(-x) - 1$$



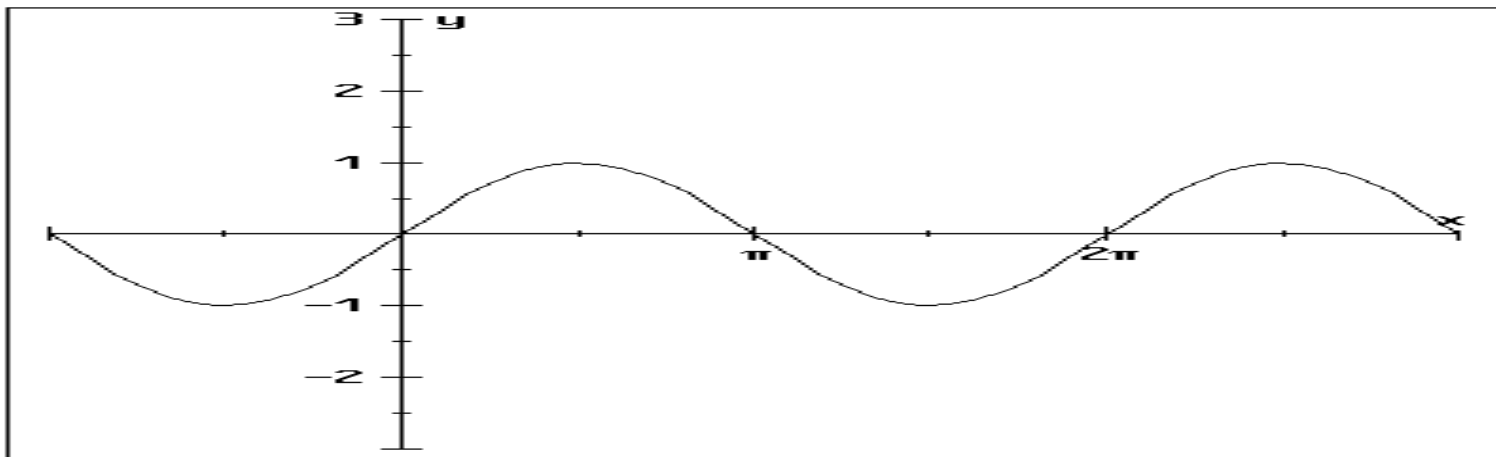
$$t(x) = -2 \sin\left(3x - \frac{\pi}{2}\right)$$



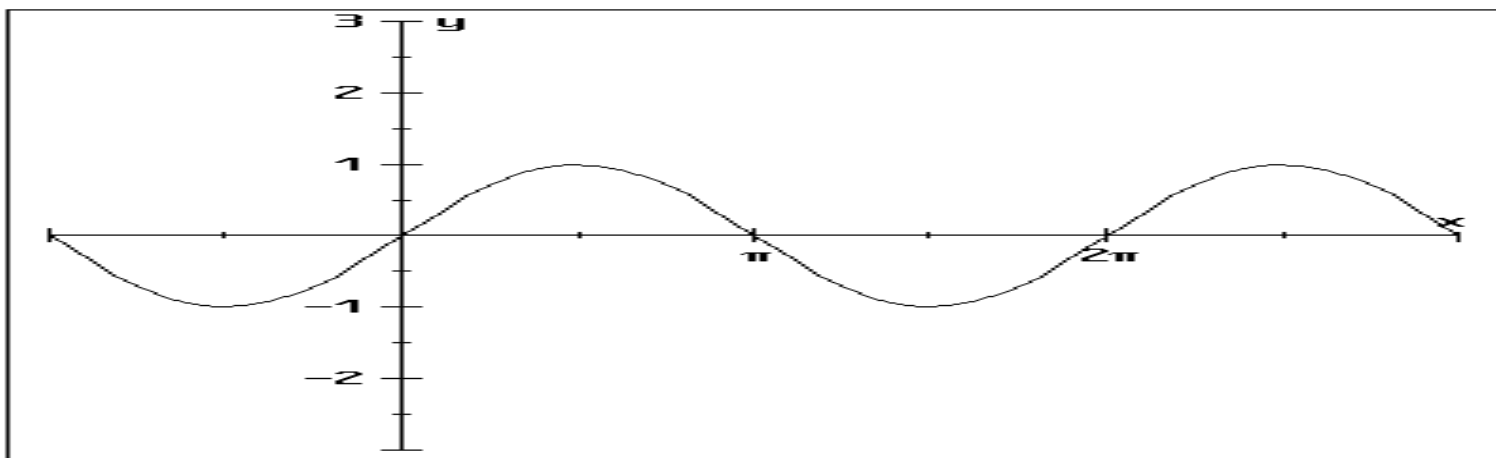
$$h(x) = |\sin x|$$



$$p(x) = \sin^2 x$$



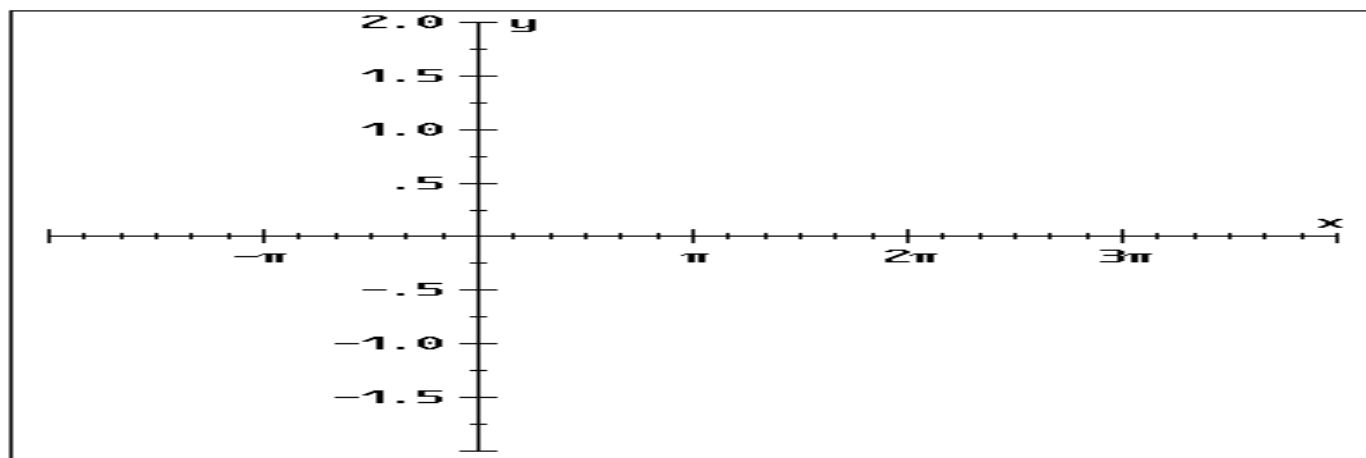
$$s(x) = \frac{1}{\sin x}$$



$$f(x) = \cos x$$

Note: $\cos(t + 2n\pi) = \cos t$ We say $\cos t$ has a period of 2π

x	$\cos x$	x	$\cos x$	x	$\cos x$	x	$\cos x$
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$\frac{\pi}{2}$		π		$\frac{3\pi}{2}$		2π	



Domain:

Range:

Symmetry:

Period:

Intercepts:

Extrema

The most general form of the equation is

$$f(x) = a \cos (bx + c) + d = a \cos b\left(x + \frac{c}{b}\right) + d$$

a → vertical stretch/compression (amplitude)

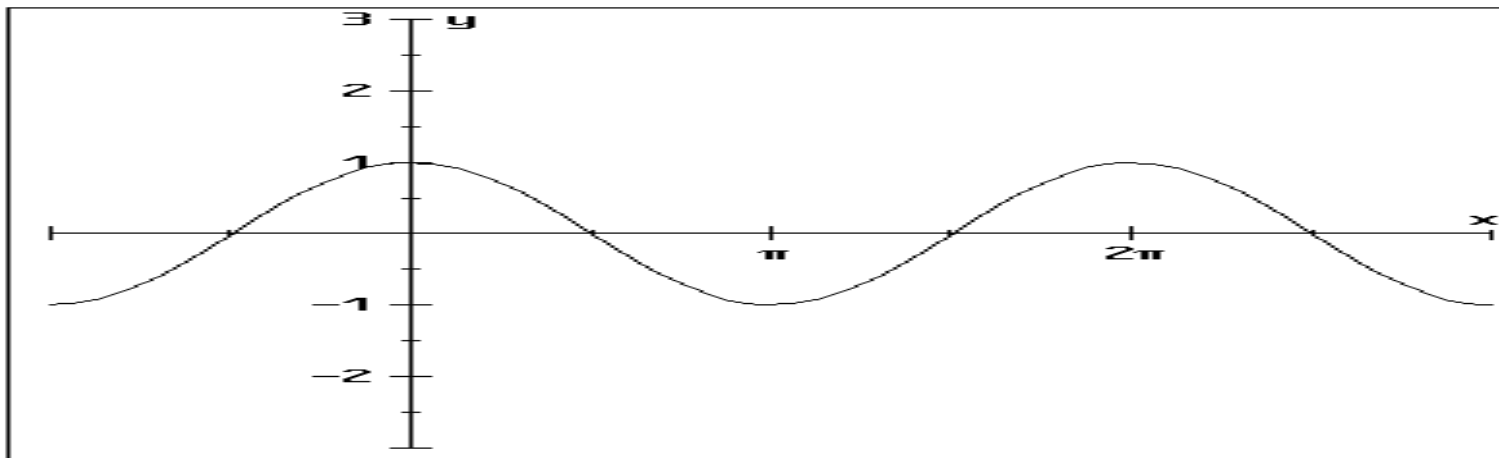
b → horizontal stretch/compression (period)

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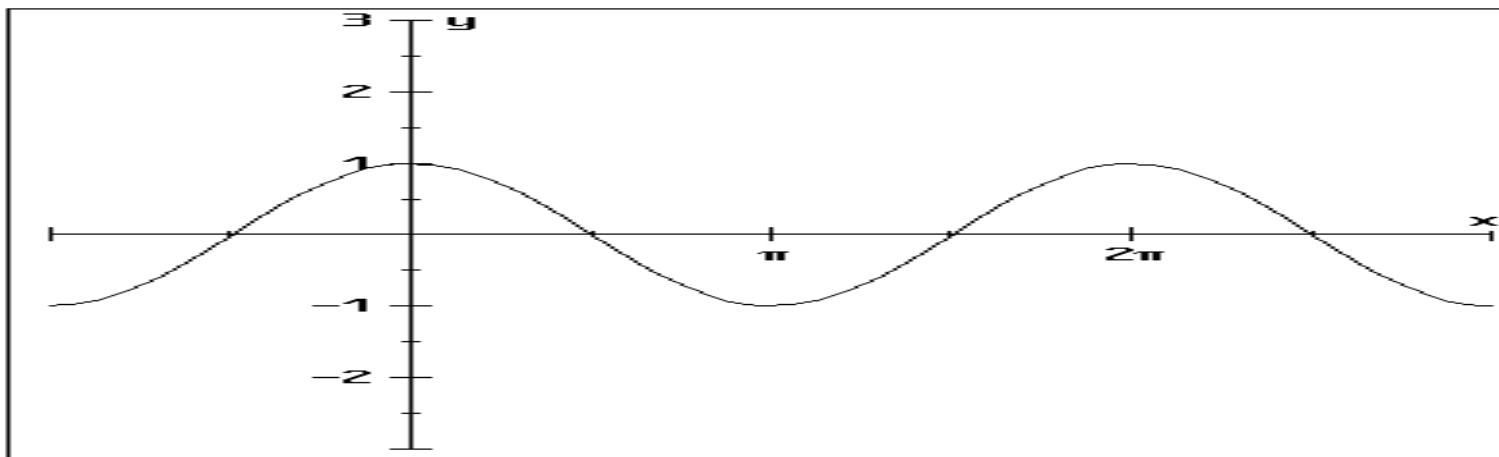
d → vertical translation

Indicate the transformations implied and sketch the graph of each of the following:

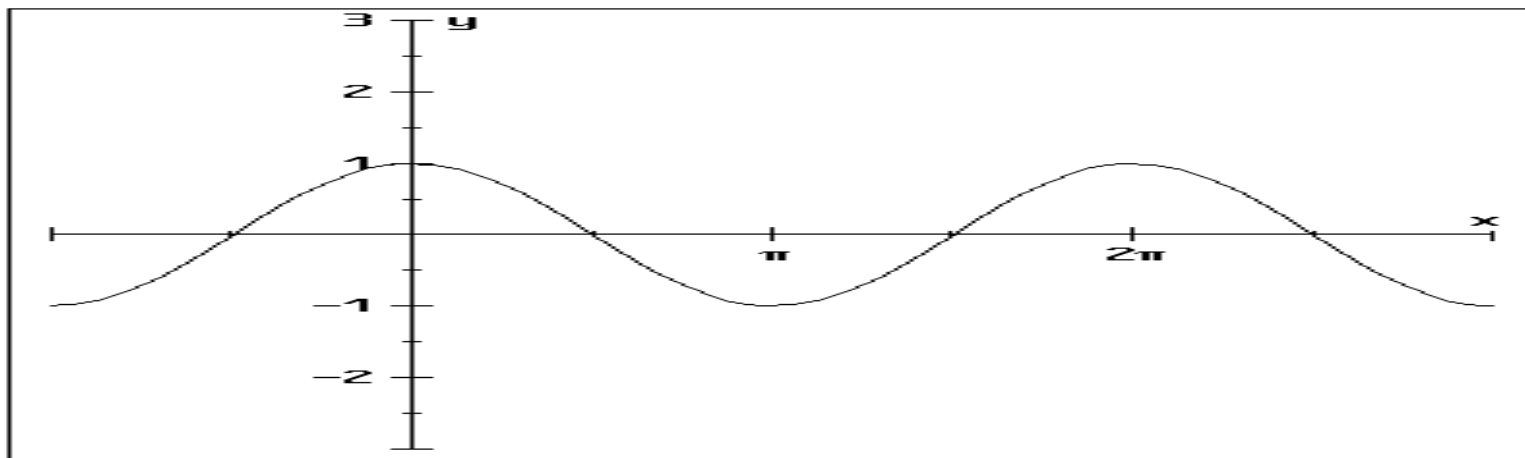
$$f(x) = 2 \cos x$$



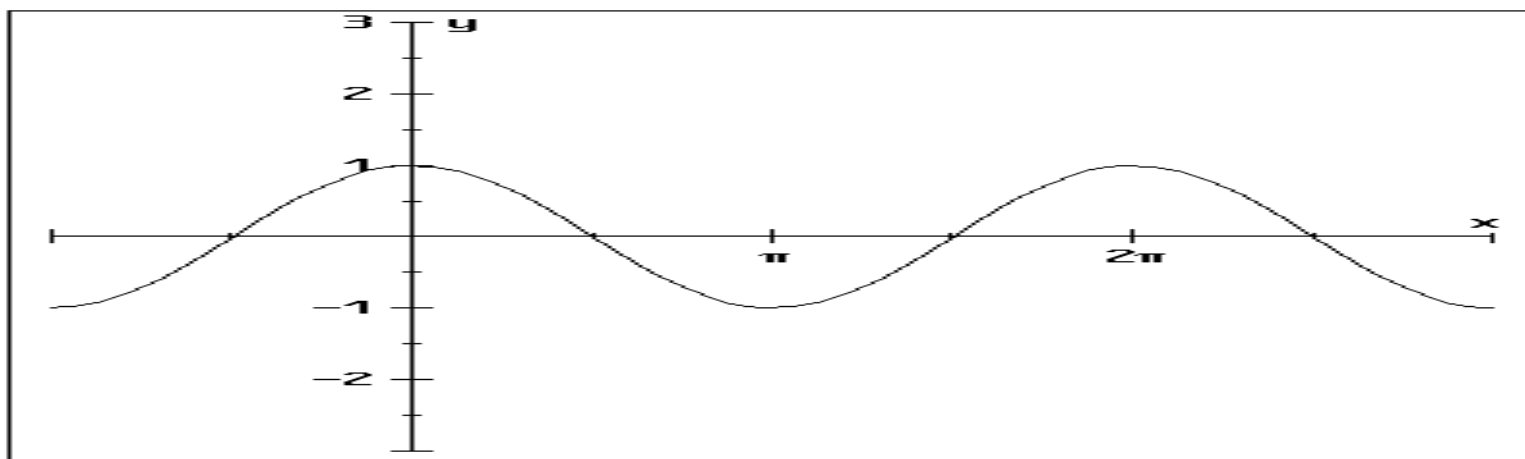
$$g(x) = \cos 2x$$



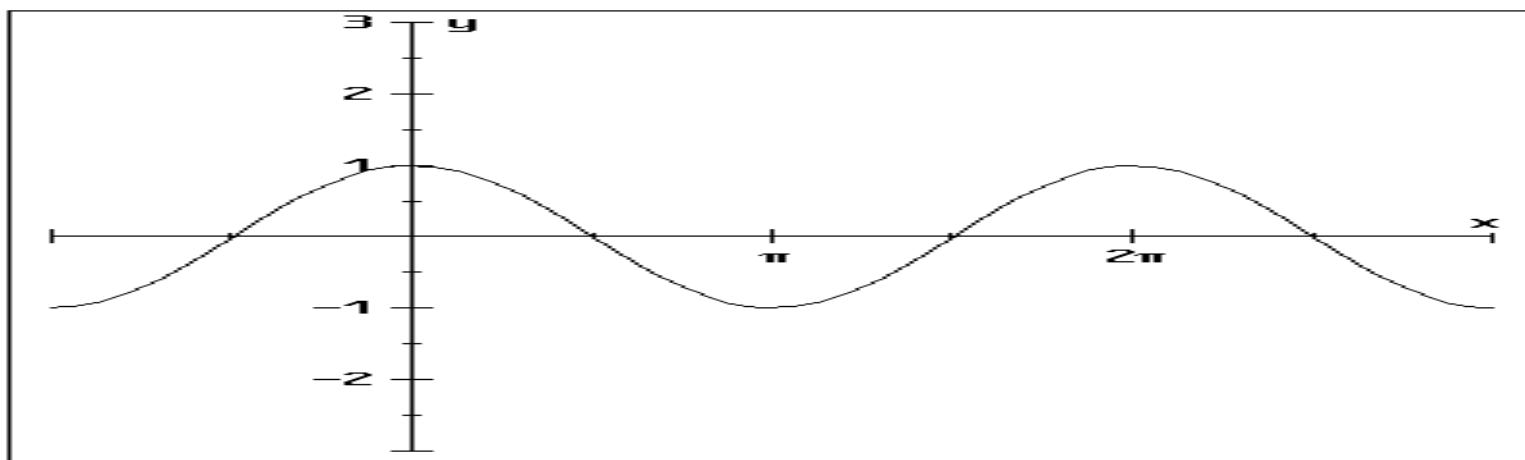
$$l(x) = -\cos x$$



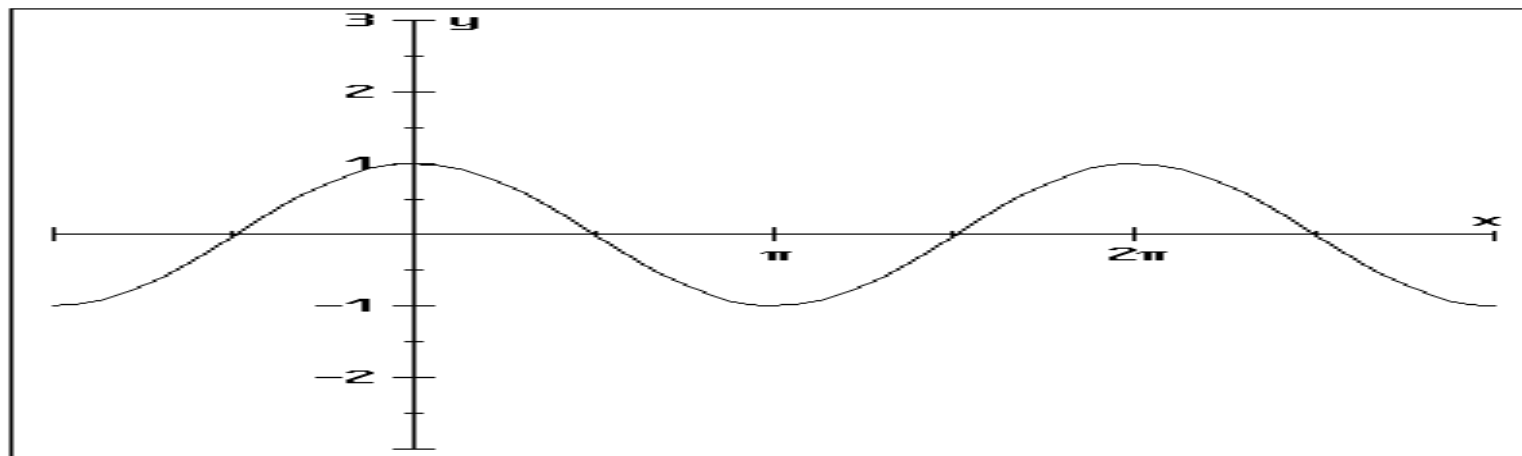
$$j(x) = 3 \cos \left(x - \frac{\pi}{4} \right)$$



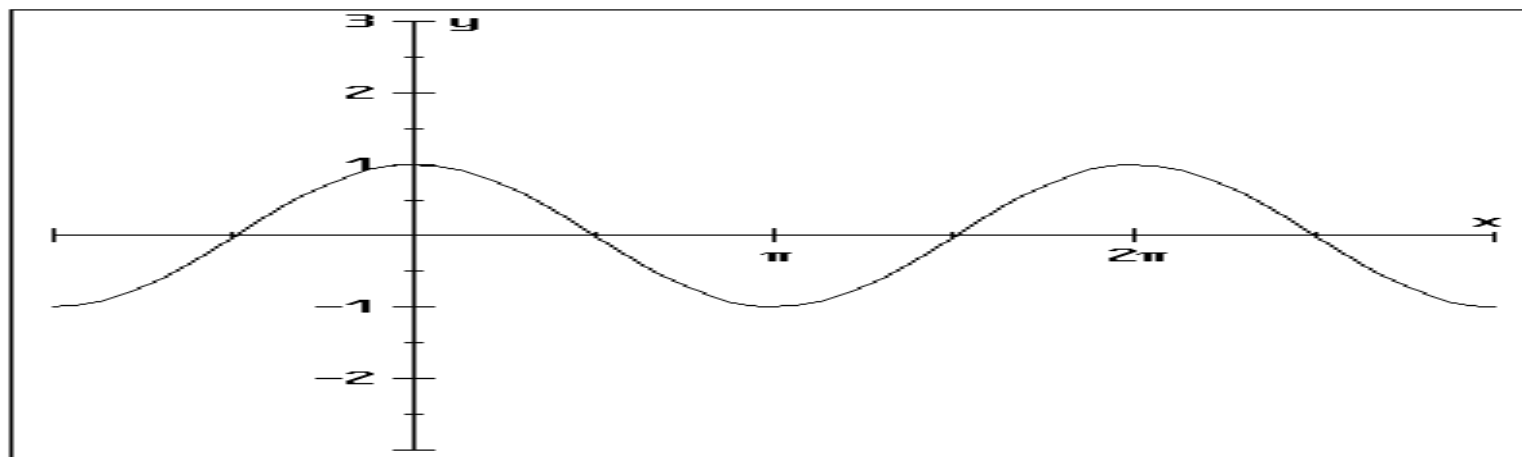
$$h(x) = \cos x + 2$$



$$r(x) = \cos(-x) - 1$$



$$t(x) = -2 \cos\left(\frac{\pi}{6} - x\right)$$

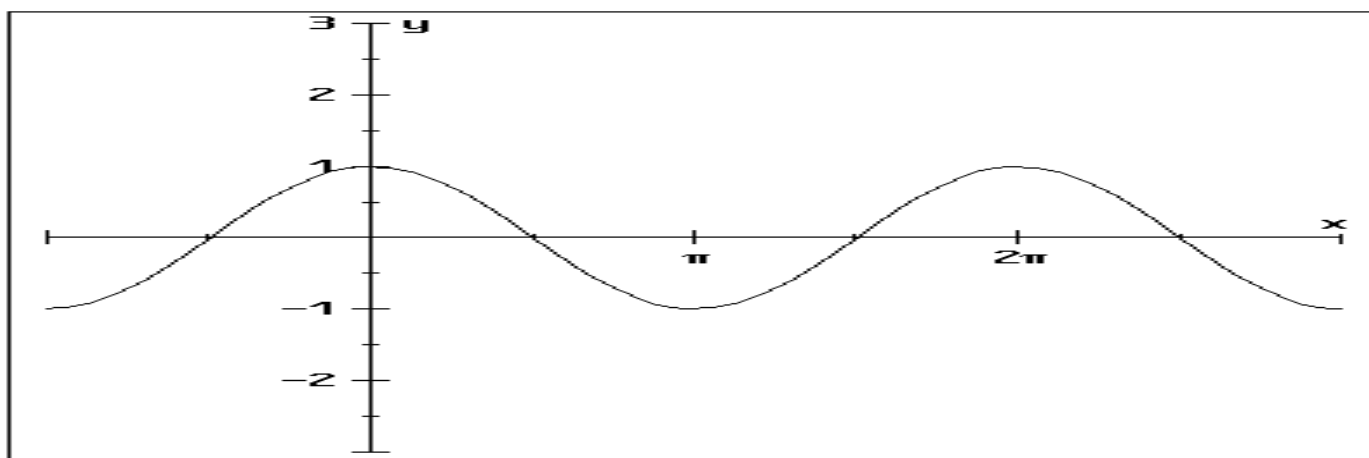


$$g(x) = \frac{1}{2} \cos\left(\frac{1}{3}x + \frac{\pi}{2}\right)$$

$$h(x) = 3\cos \pi x$$

$$p(x) = -\cos\left(\frac{\pi}{4}x - \frac{\pi}{2}\right)$$

$$s(x) = \frac{1}{\cos x}$$



Identify the following graph in two different ways:

