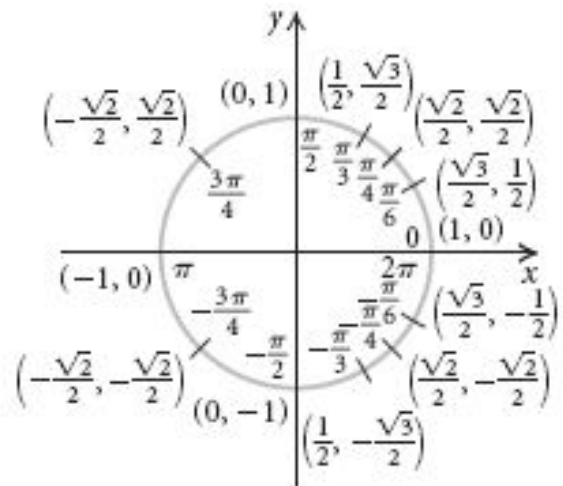
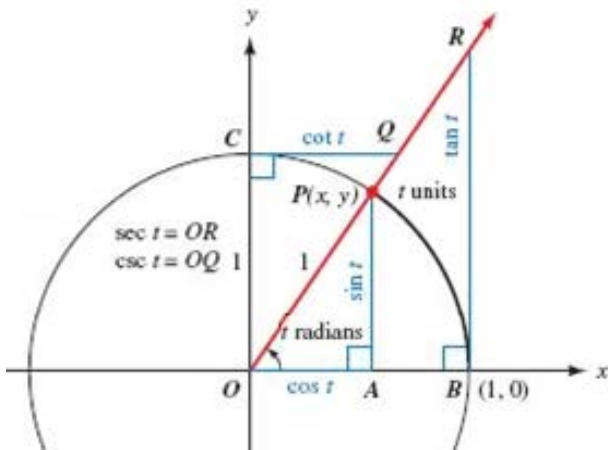


5.5 Graphs of Sine and Cosine Functions

Recall the values of sine and cosine at special angles:

t	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	π	$\frac{7\pi}{6}$	$\frac{4\pi}{3}$	$\frac{3\pi}{2}$	$\frac{5\pi}{3}$	$\frac{11\pi}{6}$	2π
$\sin t$	0	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	0
$\cos t$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	0	$-\frac{1}{2}$	$-\frac{\sqrt{3}}{2}$	-1	$-\frac{\sqrt{3}}{2}$	$-\frac{1}{2}$	0	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	1



Sine Function:

basic properties:

Domain:

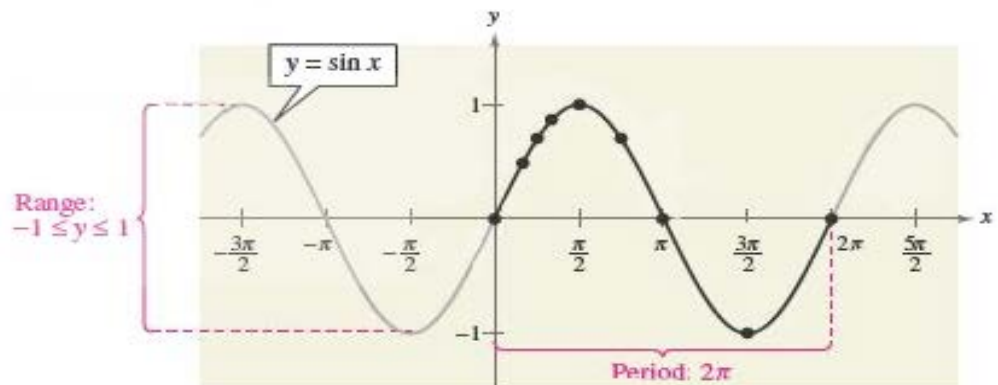
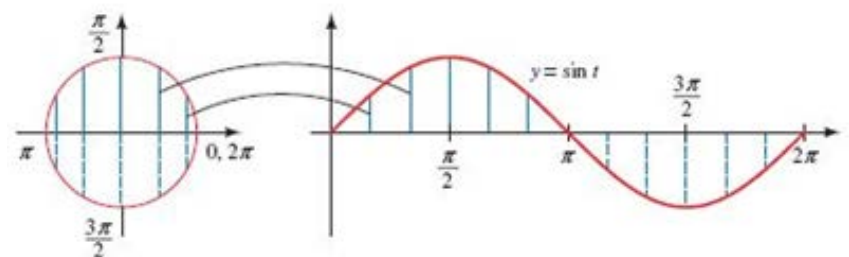
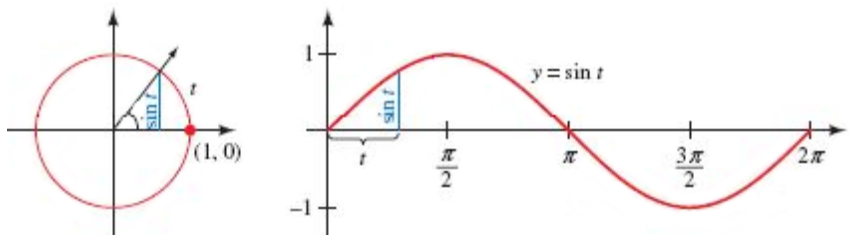
Range:

Period:

Symmetry:

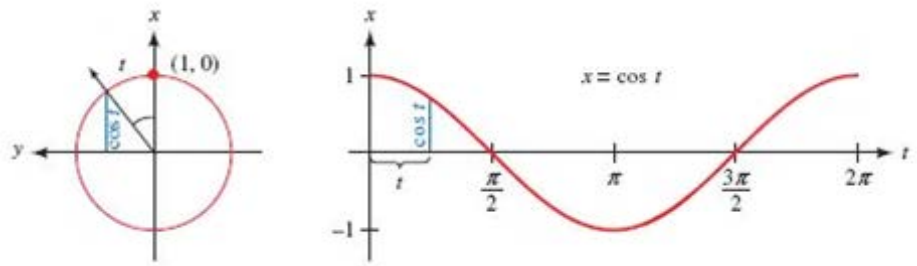
y-intercept:

x-intercepts:



Cosine Function:

Rotating the unit circle:



basic properties:

Domain:

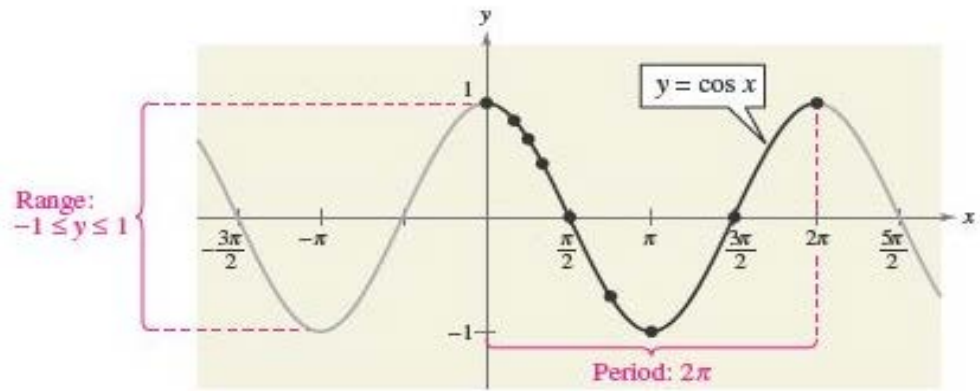
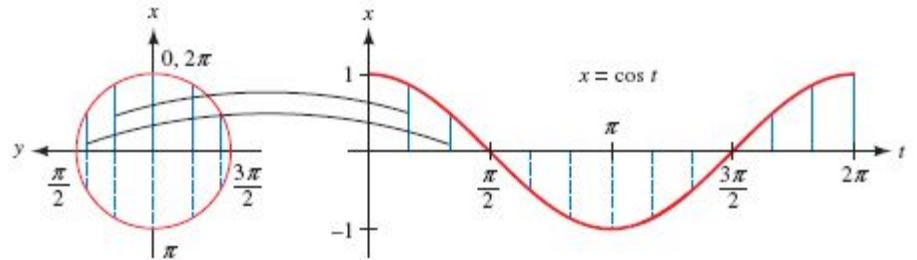
Range:

Period:

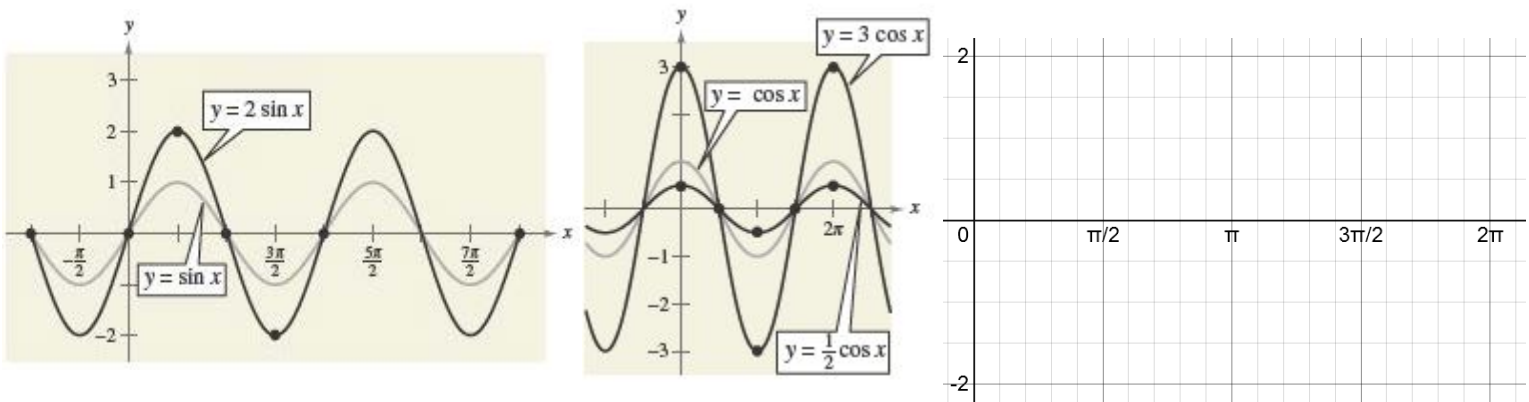
Symmetry:

y-intercept:

x-intercepts:

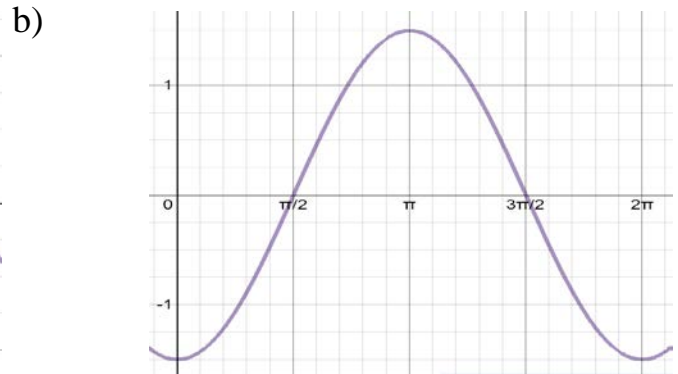
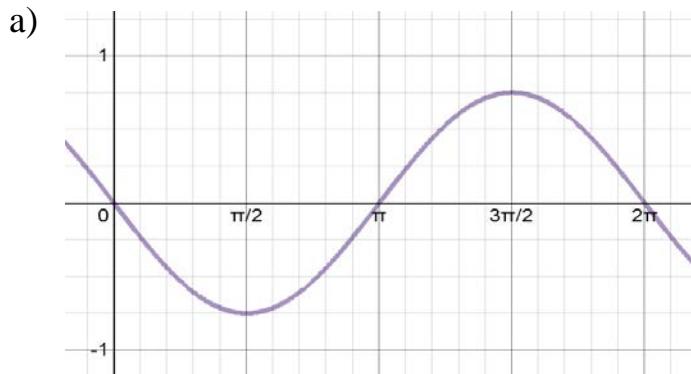


Example 1: Graph $f(x) = 2 \sin x$, $g(x) = 3 \cos x$, $h(x) = \frac{1}{2} \cos x$, and $p(x) = -2 \sin x$. Then, describe how to graph $f(x) = A \sin x$ or $f(x) = A \cos x$, for any $A \in \mathbb{R}$.

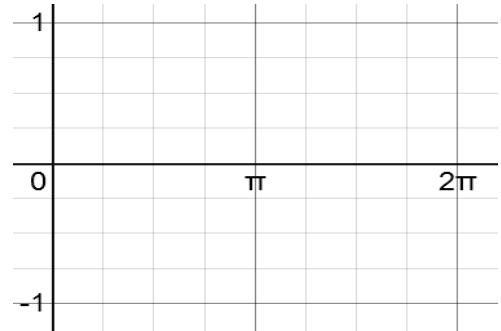
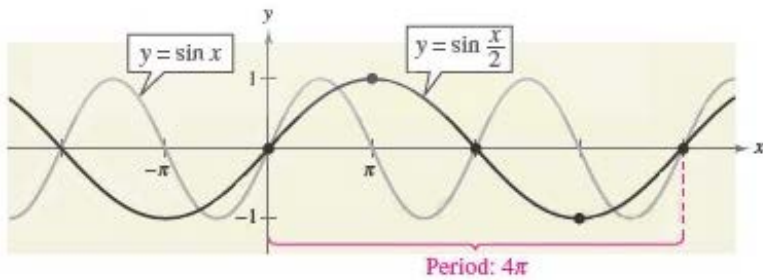


Definition: Half of the difference between the maximum and minimum values of a cyclic function is called the **amplitude**. Therefore, the amplitude of $y = A \sin x$ or $y = A \cos x$ is $|A|$.

Example 2: Find a formula for the function given by the graph.



Example 3: Graph $f(x) = \sin\left(\frac{1}{2}x\right)$, and $g(x) = \cos 2x$.

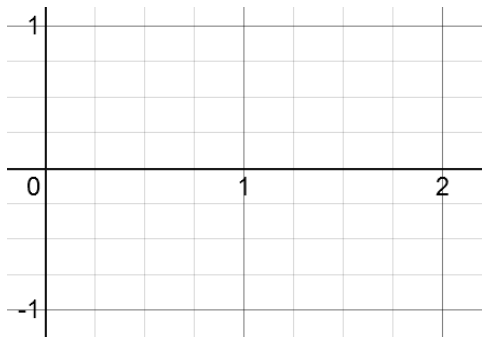


The period of $f(x) = \sin Bx$ or $f(x) = \cos Bx$, for any $B \in \mathbb{R} \setminus \{0\}$ can be found by the rule:

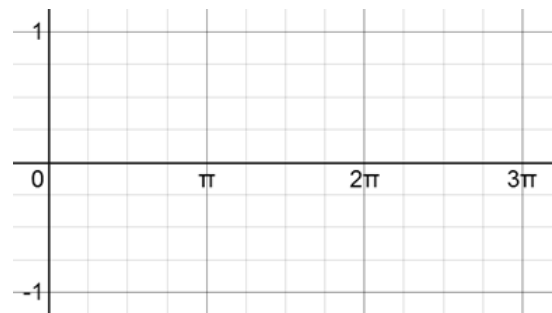
$$\text{Period} = \frac{2\pi}{|B|}$$

Example 4: Give the period and graph.

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

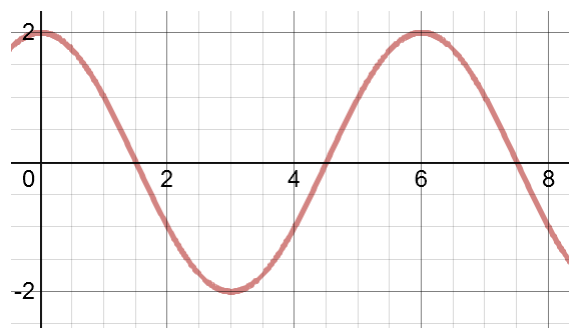


b) $g(x) = -\cos\left(\frac{2}{3}x\right)$.

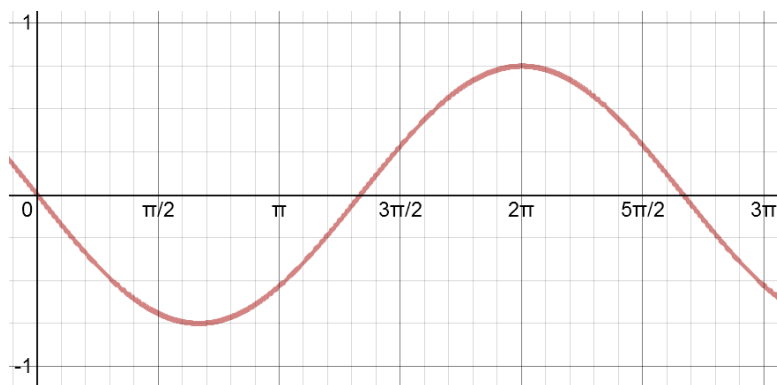


Example 5: Find a formula for the function given by the graph.

a)

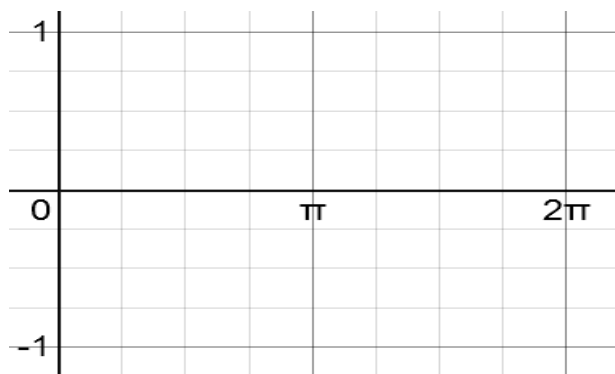


b)



Example 6: Graph.

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



b) $g(x) = -\left|2\cos\left(\frac{\pi x}{2}\right)\right|$

