

Advanced Math

4-5

Graphs of Sine and Cosine Functions

Amplitude - Maximum Displacement from
Equilibrium.

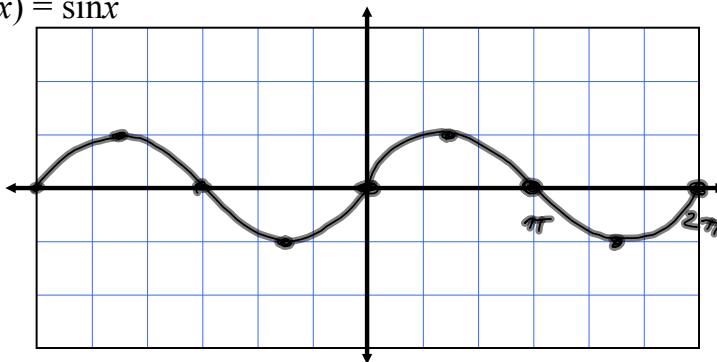
Period - The minimum x distance it takes for
a function to repeat itself.

Phase Shift - Sliding a periodic function in its plane
of equilibrium.

Graph the Sine function.

Domain: \mathbb{R}
 Range: $[-1, 1]$
 Period: 2π
 Amplitude: 1

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

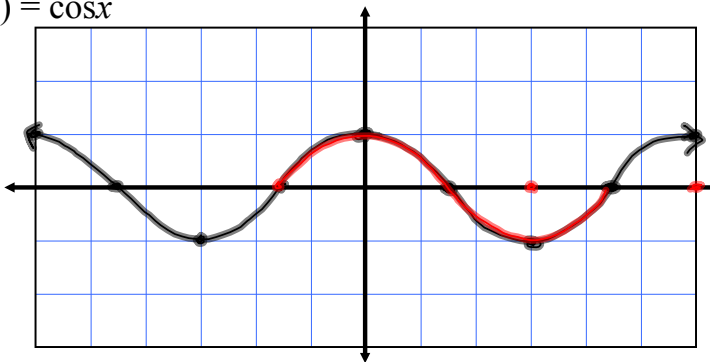


$(0, 0)$ $(\frac{\pi}{2}, 1)$
 $(2\pi, 0)$ $(\frac{3\pi}{2}, -1)$
 $(\pi, 0)$

Graph the Cosine function.

Domain: \mathbb{R}
 Range: $[-1, 1]$
 Period: 2π
 Amplitude: 1

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



$(0, 1)$ $(\frac{\pi}{2}, 0)$
 $(2\pi, 1)$ $(\frac{3\pi}{2}, 0)$
 $(\pi, -1)$



Given the general Sine function, list the effects of $a, b, c,$ and $d.$

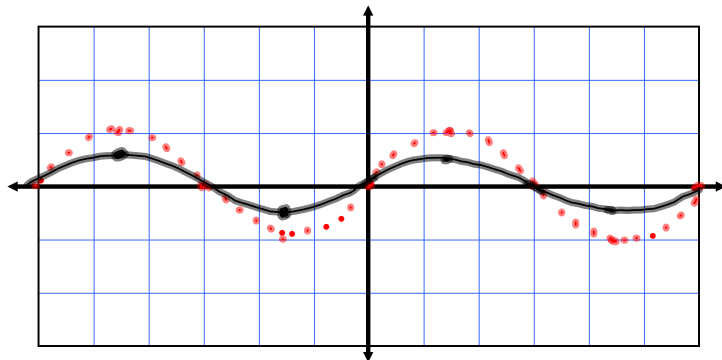
$$f(x) = a \sin (bx - c) + d$$

- $\frac{\text{period}}{b}$
 $-\frac{c}{b}$
- a : vertical stretch/compression, changes amp.
 - b : horizontal stretch/compression, changes period
 - c : slides left or right, changes phase shift
 - d : slides up and down.

Graph: $h(x) = \frac{1}{2} \sin x.$

↑
changes
amplitude

$$\text{amp} = 1 \cdot \frac{1}{2} = \frac{1}{2}$$

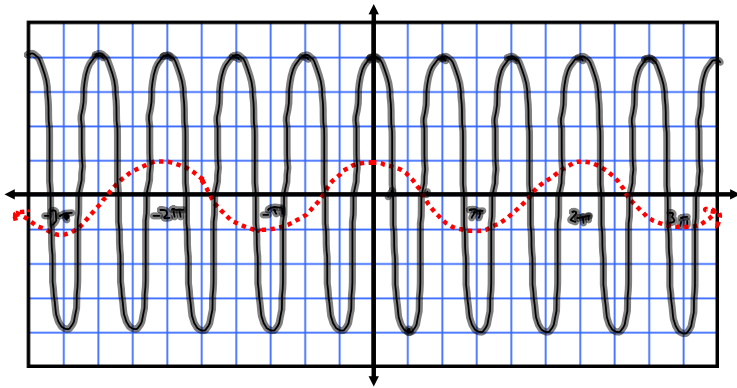


The original sine graph is dotted in red to compare to $h(x).$

Graph: $b(x) = 4\cos(3x)$.

Amplitude: 4

pd: $\frac{2\pi}{3}$



Original cosine is graphed in red for comparison.

Assignment:
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1-14 all

Graph the following:

- 1) $f(x) = \sin x$
- 2) $g(x) = \cos x$
- 3) $h(x) = 3\sin x$
- 4) $j(x) = \cos \frac{1}{2}x$
- 5) $k(x) = 2\sin(2x) - 1$