6.4 Graphs of Sine and Cosine Functions


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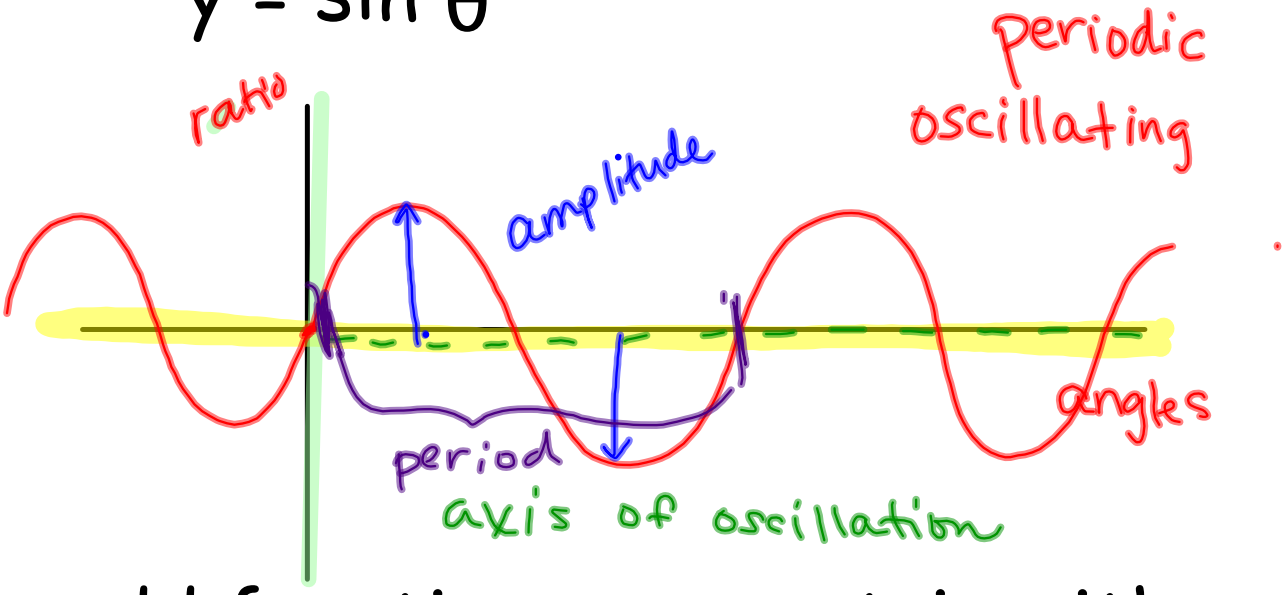
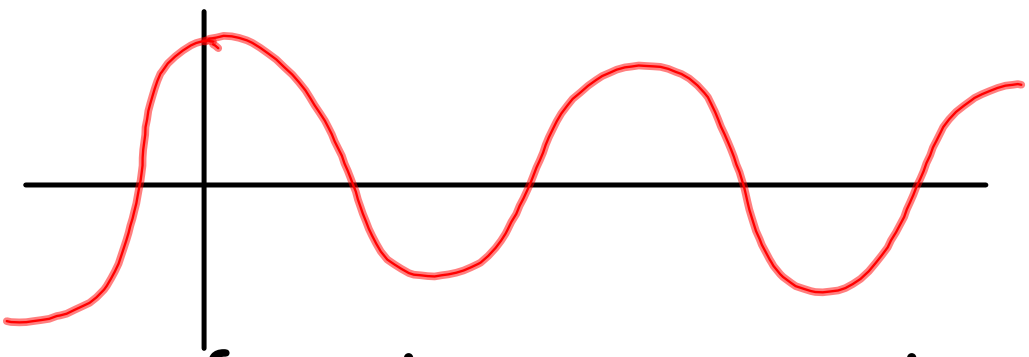
YOU MAY BE RIGHT, PYTHAGORAS, BUT EVERYBODY'S GOING TO LAUGH IF YOU CALL IT A "HYPOTENUSE!"
THAVES 5-15

$y = \sin \theta$



-odd function: symmetric with the origin

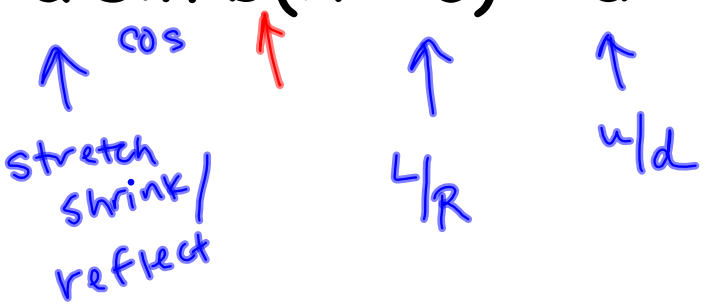
$y = \cos \theta$

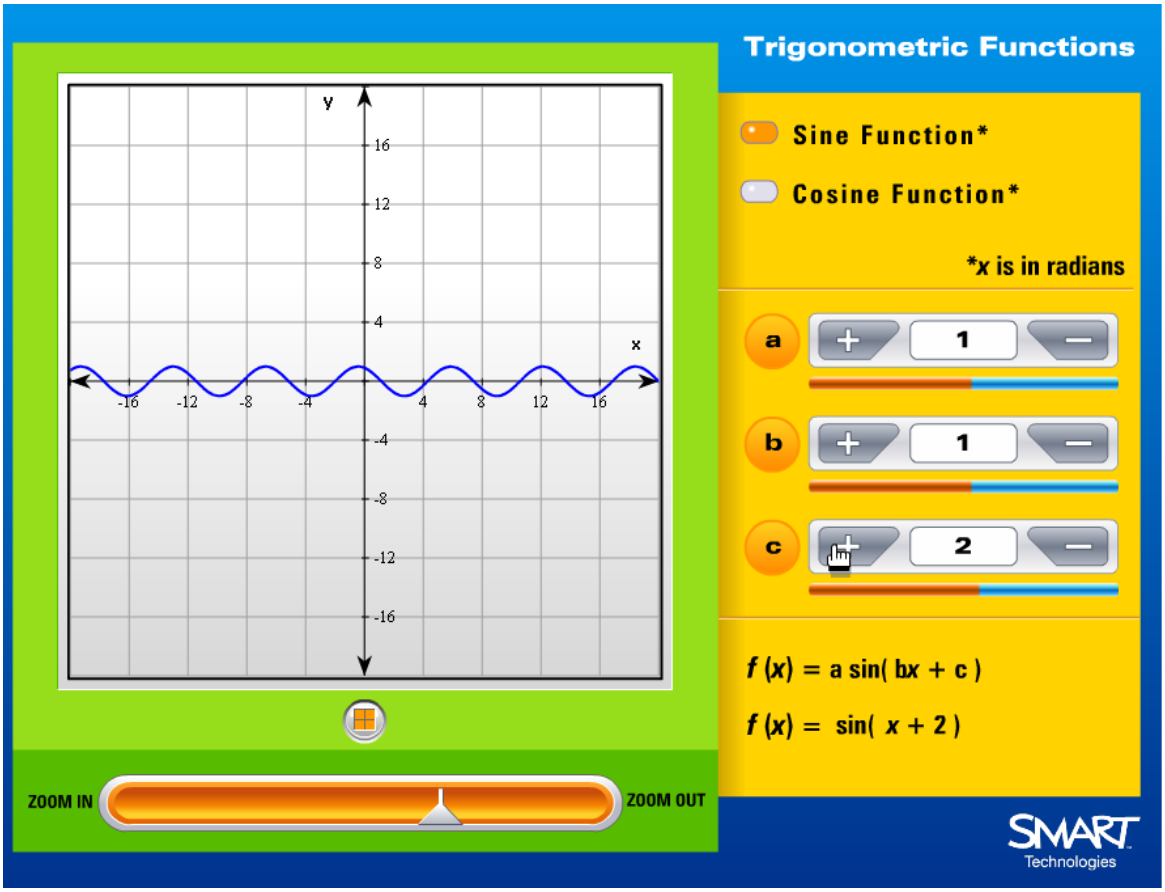


even function: symmetric with respect to the y axis

General Form:

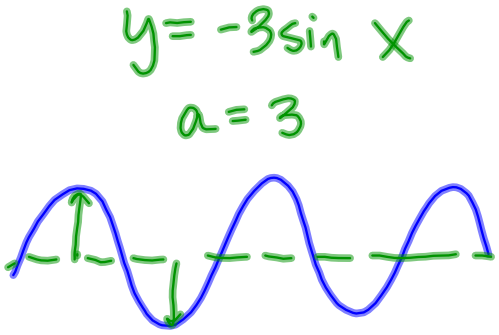
$y = a \sin b(x - c) + d$

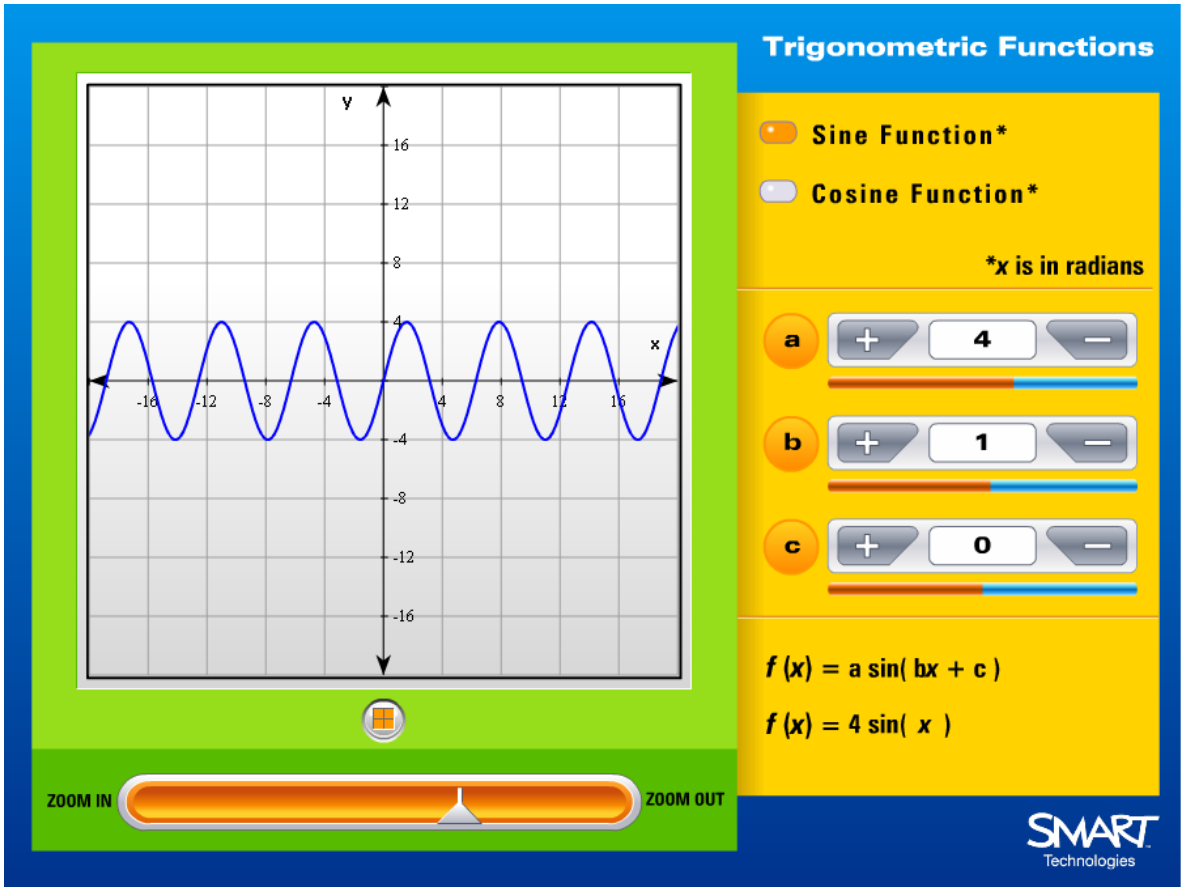



Trigonometric Functions
Sine Function*
Cosine Function*
*x is in radians
a
1
b
1
c
2
f (x) = a sin(bx + c)
f (x) = sin(x + 2)
y
x
16
12
8
4
-4
-8
-12
-16
-16
-12
-8
-4
4
8
12
16
ZOOM IN
ZOOM OUT
SMART
Technologies

Amplitude: half the distance between the max and min values of the function.

$|a|$



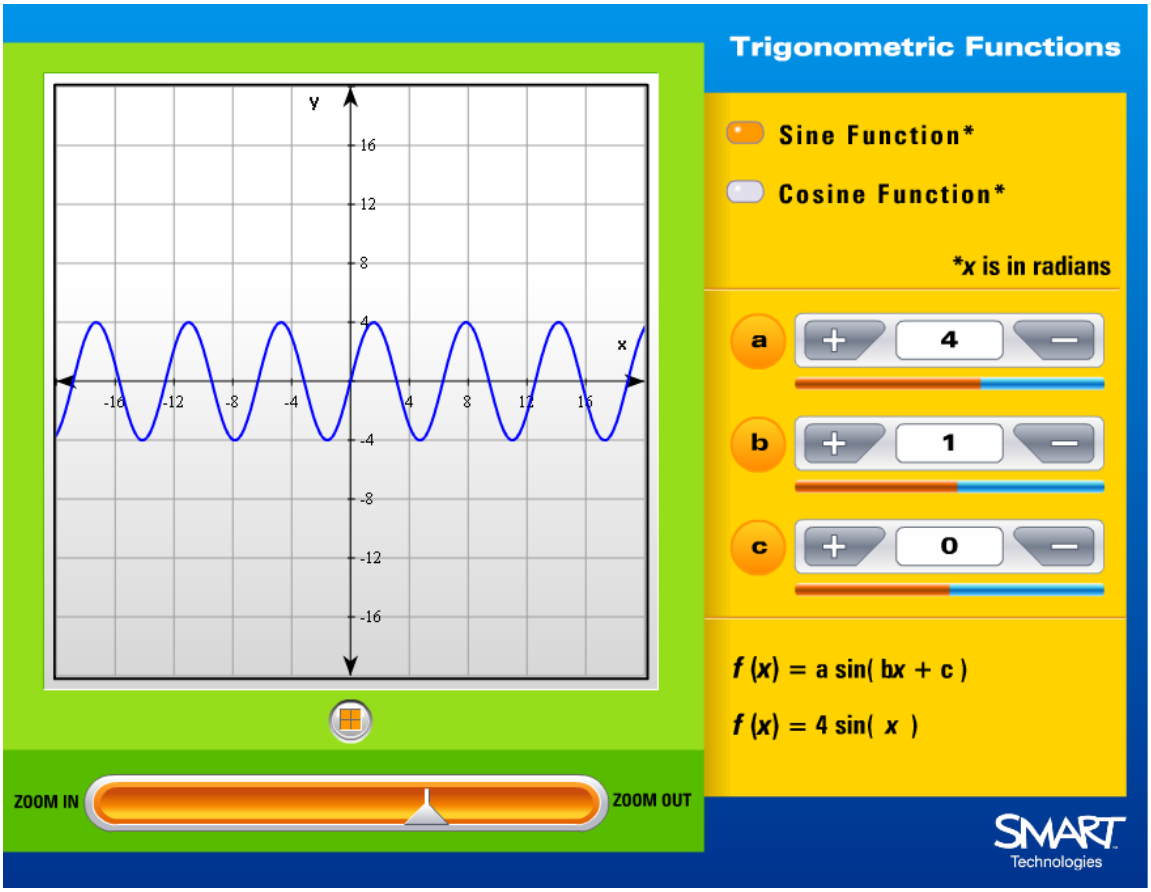

Trigonometric Functions
Sine Function*
Cosine Function*
*x is in radians
a
4
b
1
c
0
f (x) = a sin(bx + c)
f (x) = 4 sin(x)
y
x
16
12
8
4
-4
-8
-12
-16
-16
-12
-8
-4
4
8
12
16
ZOOM IN
ZOOM OUT
SMART
Technologies

Period: how long it takes to complete one cycle.

$$P = \frac{2\pi}{b}$$

$y = \sin 4x$

$P = \frac{2\pi}{4} = \frac{\pi}{2}$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ZOOM IN
ZOOM OUT
SMART
Technologies

Phase shift: horizontal transitions

General Form:

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

$|a|$ = amplitude

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

c= phase shift

d = vertical shift

$y = \sin(4x+8)$

$\neq y = \sin 4(x+2)$

$\neq$ b on the outside of parenthesis

Ex 1 Find the period and amplitude.

$y = 3 \sin 2x$

$a = 3$

$P = \frac{2\pi}{2} = \pi$

Ex 2 Find the period and amplitude.

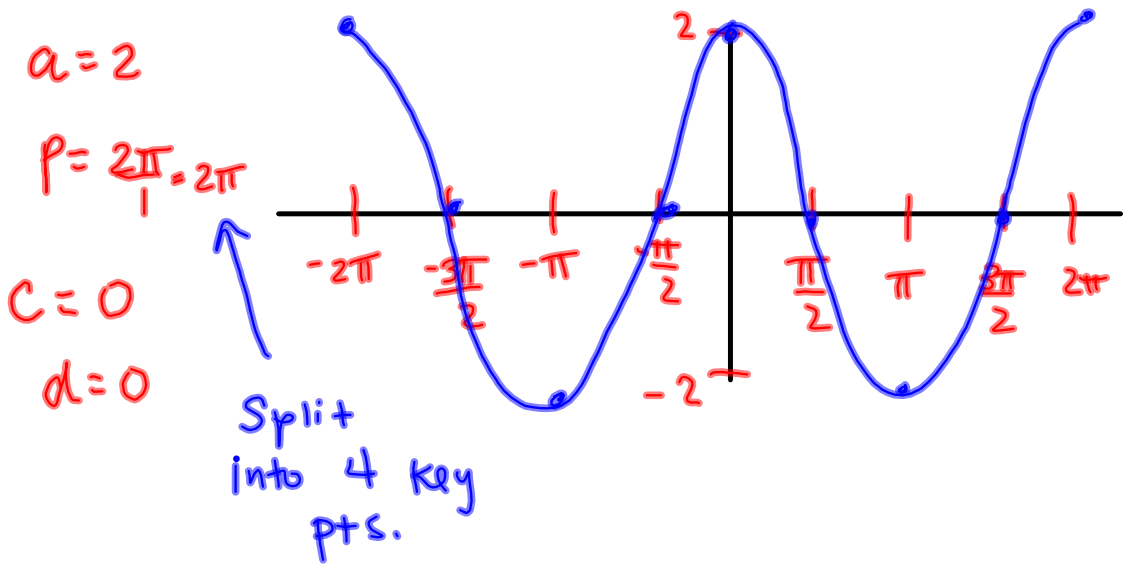
$$y = \frac{5}{2}\cos\frac{x}{2}$$

$a = \frac{5}{2}$

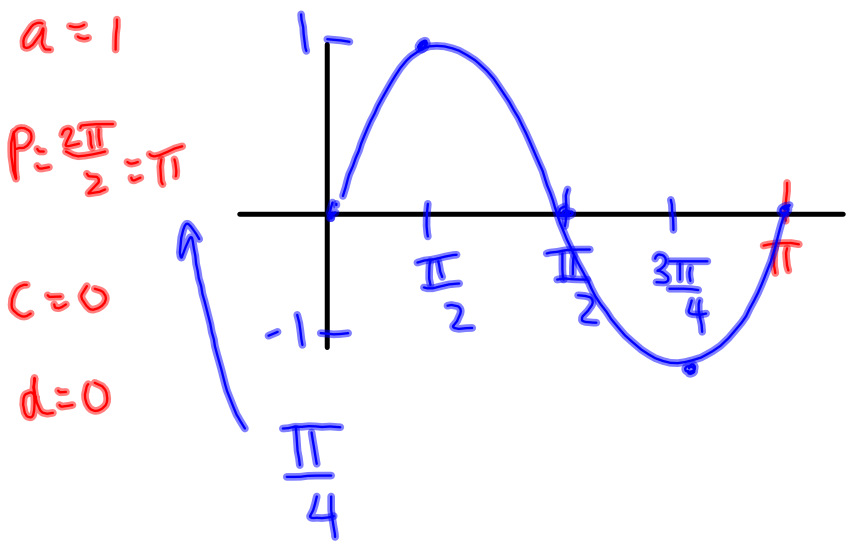
$p = \frac{2\pi}{\frac{1}{2}} = 4\pi$

Ex 4 Sketch the graph of the function by hand.

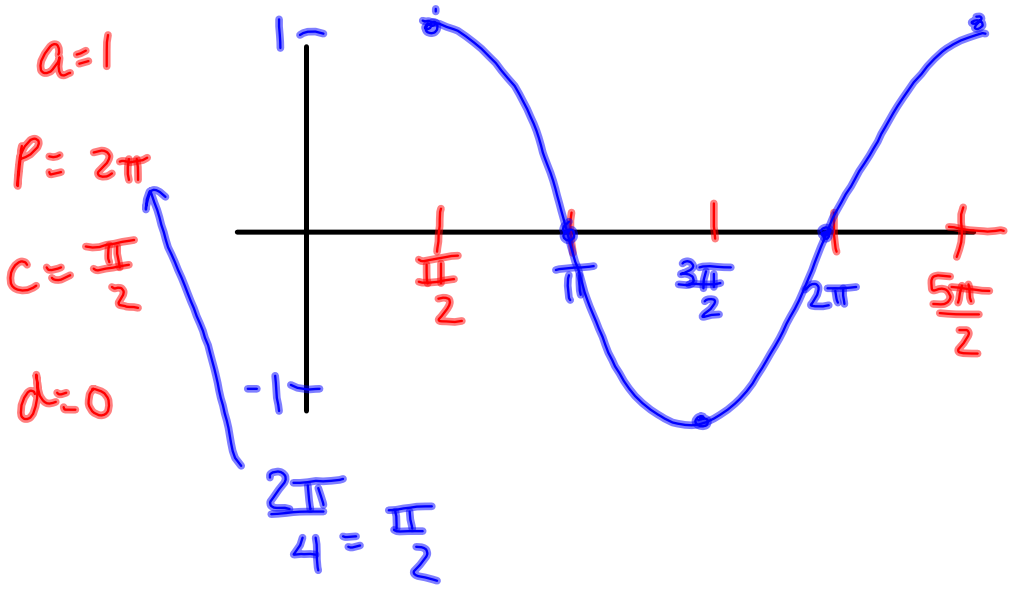
$y = 2 \cos x$, on the interval $[-2\pi, 2\pi]$



Ex 5 Sketch the graph of y = sin 2x.

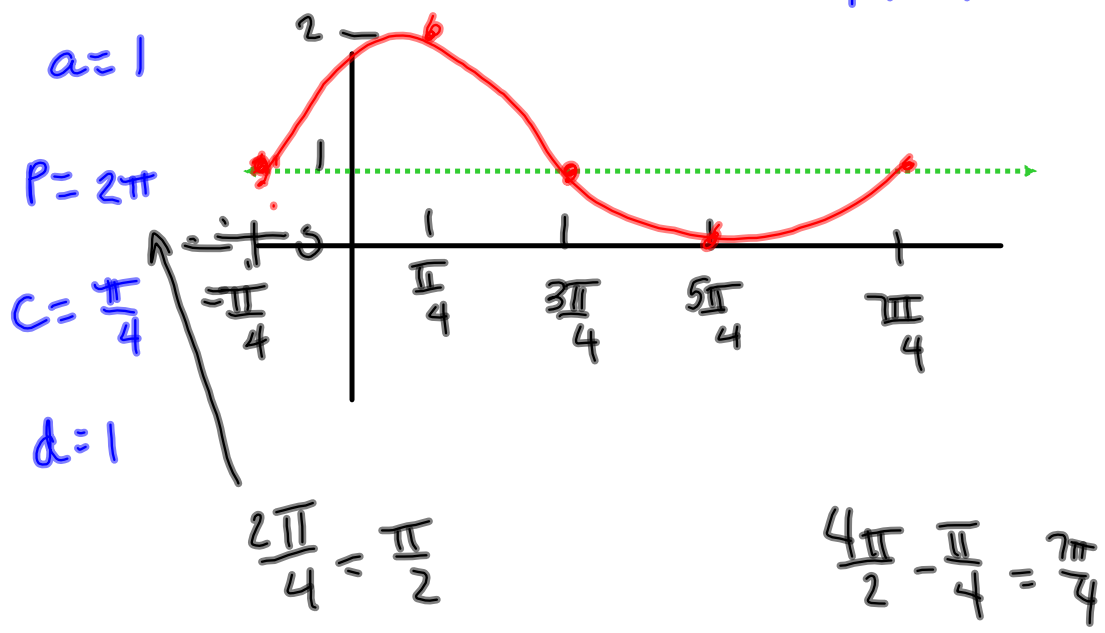


Ex 6 Sketch the graph of $y = \cos(x - \pi/2)$



Ex 7 Sketch the graph of $y = 1 + \sin(x + \pi/4)$

$= \sin\left(x + \frac{\pi}{4}\right) + 1$



sketch: $y = 3\cos\left(\frac{1}{2}x + \frac{\pi}{2}\right) - 2$

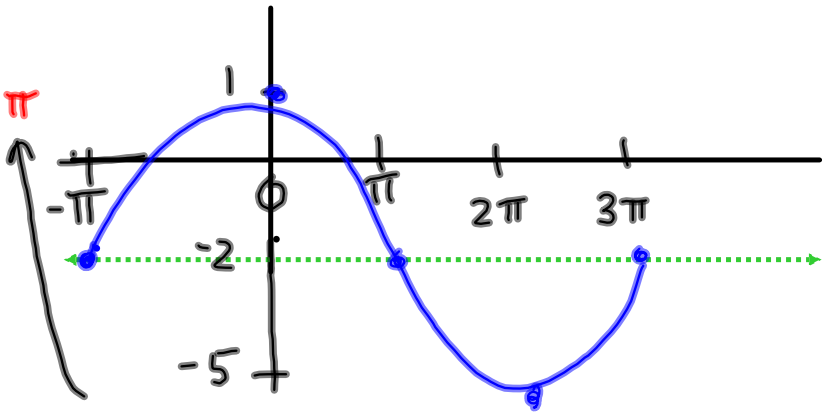
$3\cos\frac{1}{2}(x+\pi)-2$

$a = 3$

$p = \frac{2\pi}{\frac{1}{2}} = 4\pi$

$c = \pi$

$d = -2$



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