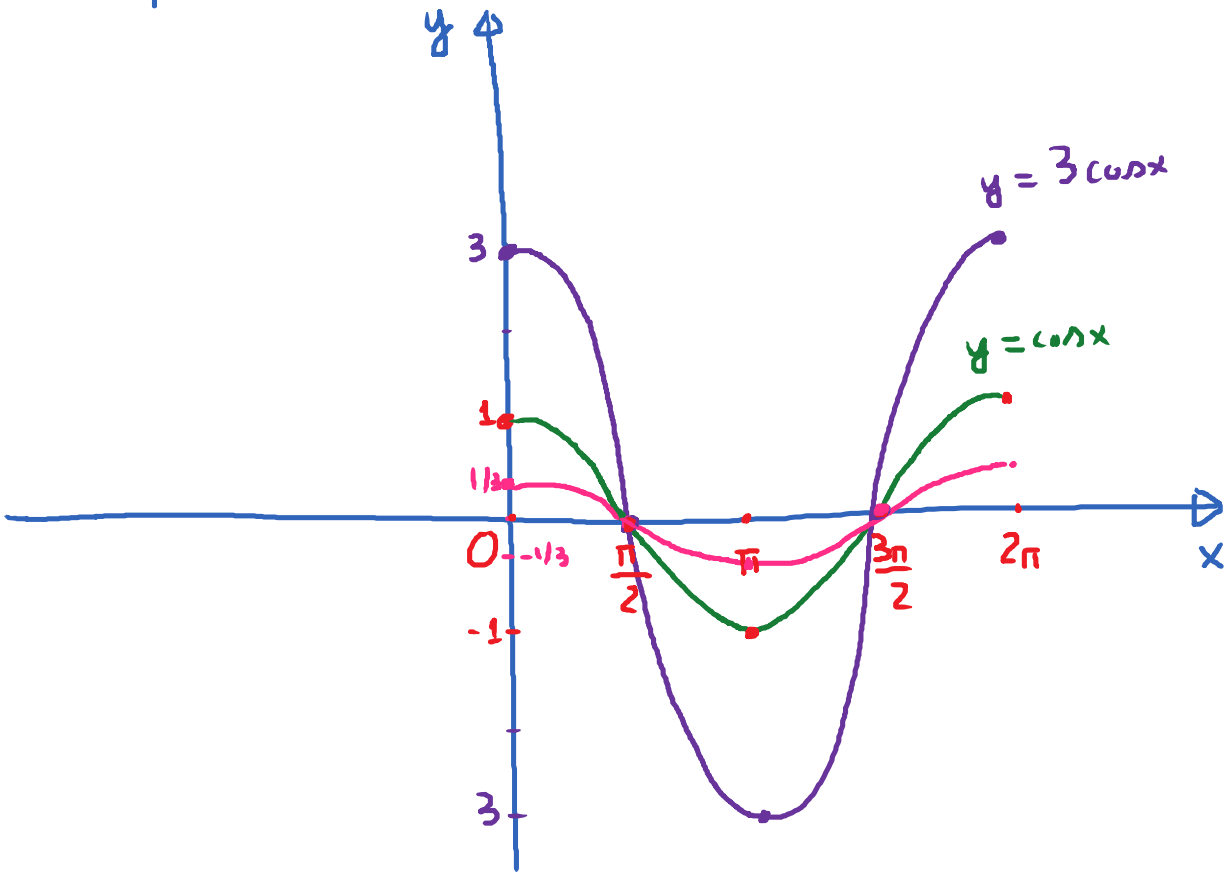
Graphs of functions of the form $y = a\cos x$



x	$y = \cos x$
0	1
$\frac{\pi}{2}$	0
π	-1
$\frac{3\pi}{2}$	0
2π	1

x	$y = 3\cos x$
0	3
$\frac{\pi}{2}$	0
π	-3
$\frac{3\pi}{2}$	0
2π	3

x	$y = \frac{1}{3}\cos x$
0	$\frac{1}{3}$
$\frac{\pi}{2}$	0
π	$-\frac{1}{3}$
$\frac{3\pi}{2}$	0
2π	$\frac{1}{3}$

The amplitude of a periodic function is half the difference between maximum and the minimum value of the function.

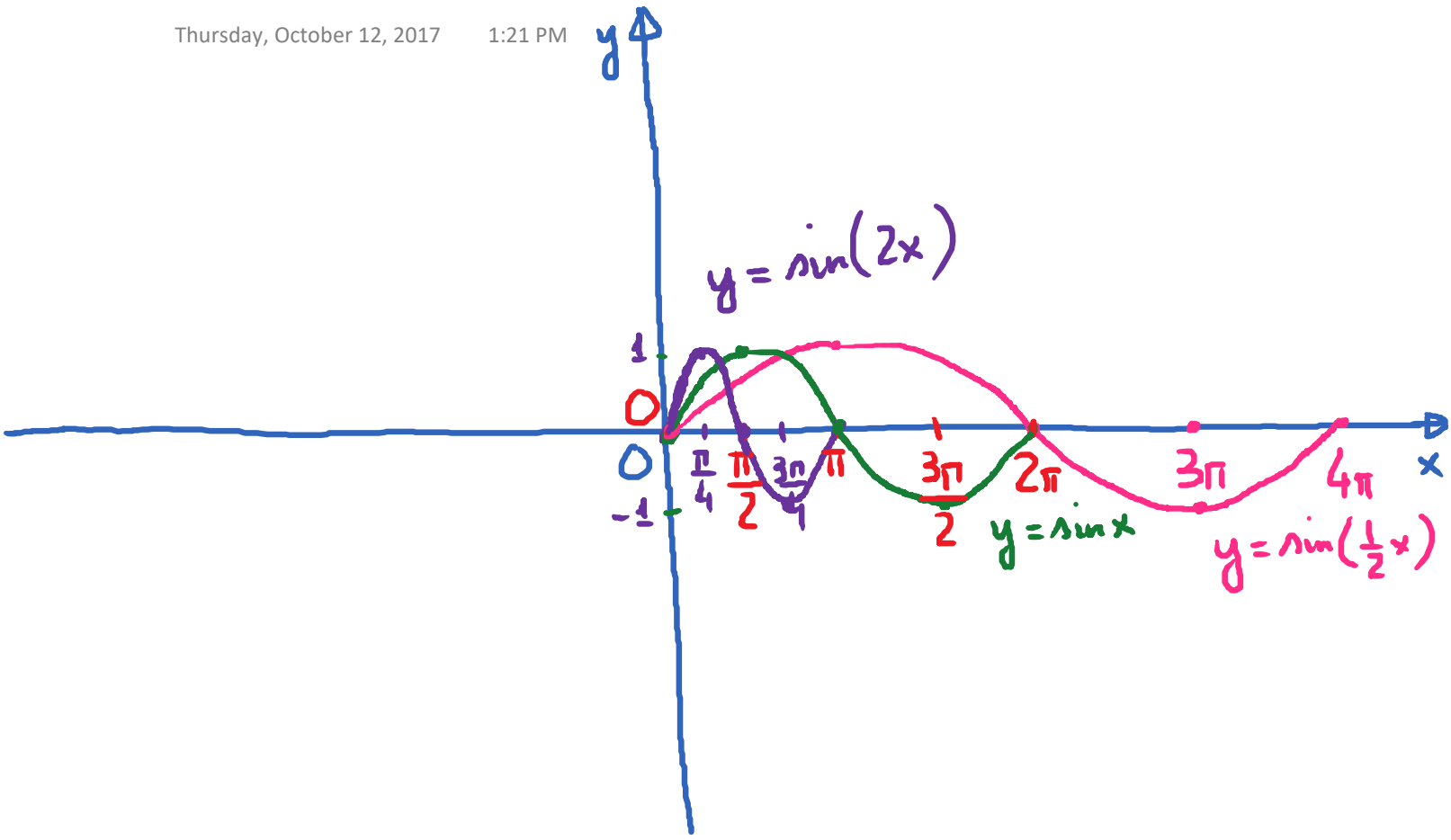
In the case of $y = a\sin x$ or $y = a\cos x$, the amplitude is $|a|$.

* Graphs of functions of the form

$$y = \sin(bx) \quad \text{or} \quad y = \cos(bx)$$

<u>E.g.</u> $y = \sin(2x)$; $y = \sin\left(\frac{1}{2}x\right)$

Graph these functions on one period.



x	$y = \sin x$
0	0
$\frac{\pi}{2}$	1
π	0
$\frac{3\pi}{2}$	-1
2π	0

x	$y = \sin(2x)$
0	0
$\frac{\pi}{4}$	1
$\frac{\pi}{2}$	0
$\frac{3\pi}{4}$	-1
π	0

x	$y = \sin(\frac{1}{2}x)$
0	0
π	1
2π	0
3π	-1
4π	0

The period of the function $y = \sin(bx)$ or $y = \cos(bx)$ is $\frac{2\pi}{b}$.

Graphs of functions of the form

$$y = a\sin(bx) \text{ or } y = a\cos(bx)$$

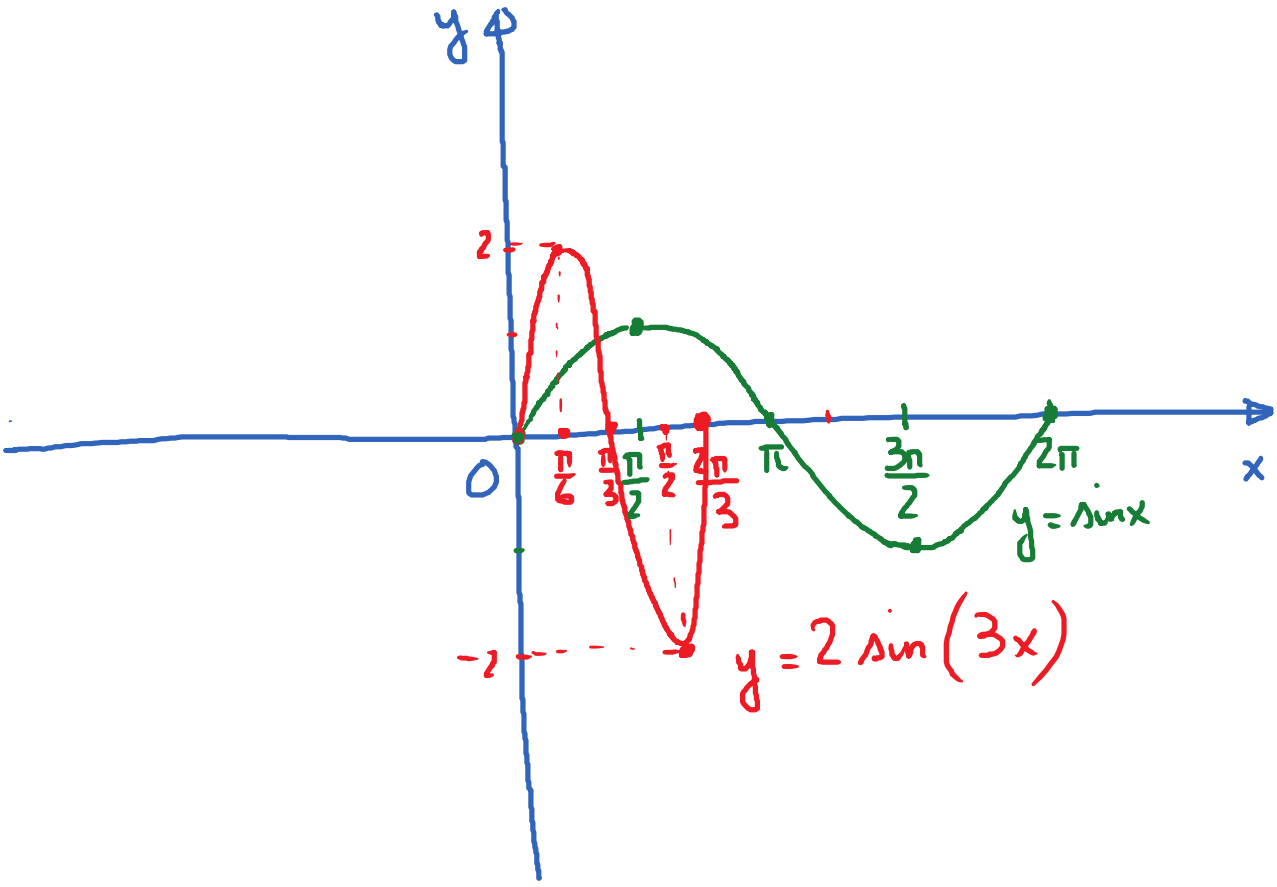
E.g. Graph the function:

$$y = 2\sin(3x)$$

in one period.

Amplitude: 2

Period $= \frac{2\pi}{3}$.



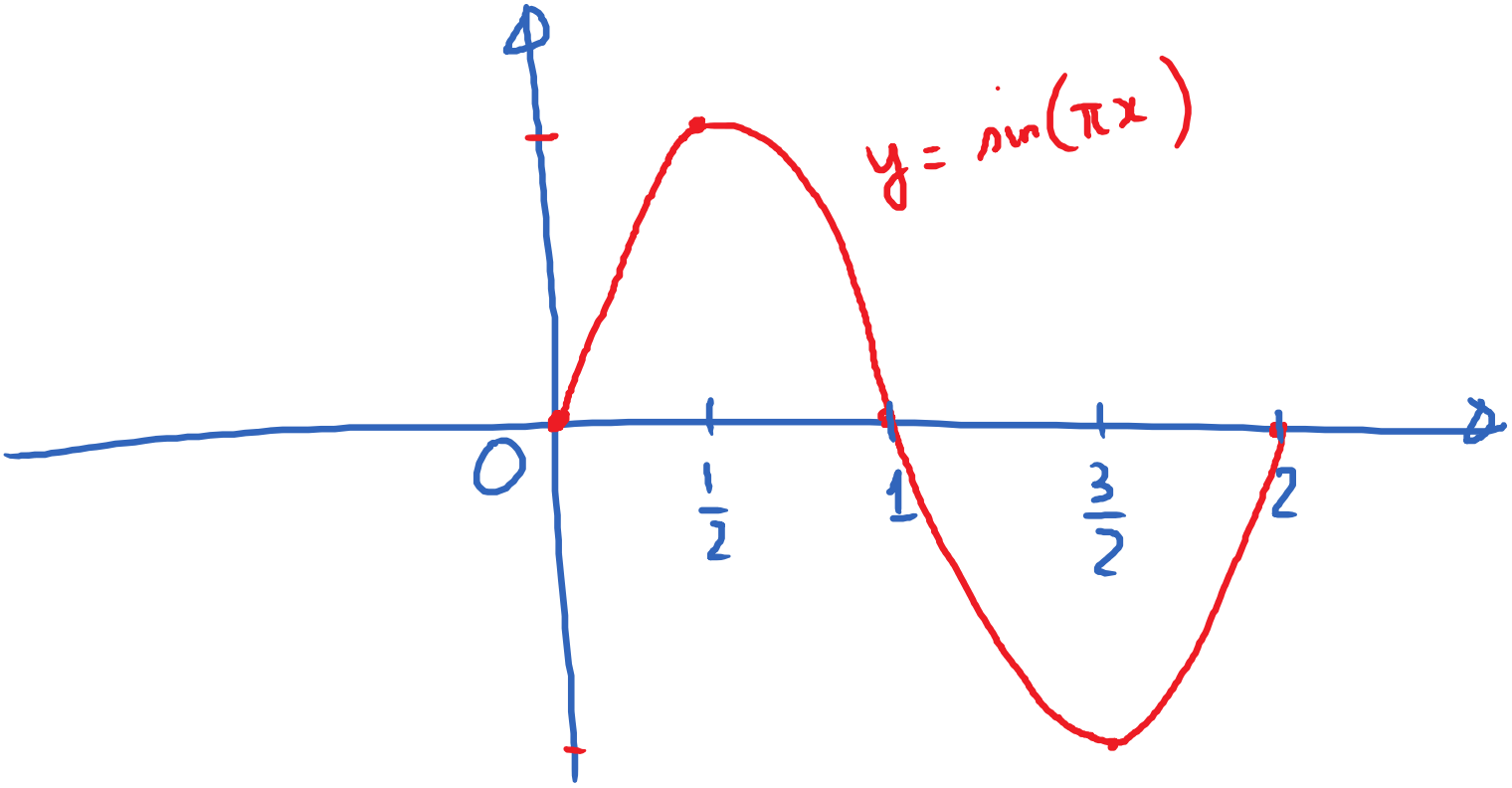
x	$y = \sin x$
0	0
$\frac{\pi}{2}$	1
π	0
$\frac{3\pi}{2}$	-1
2π	0

x	$y = 2\sin(3x)$
0	0
$\frac{\pi}{6}$	2
$\frac{\pi}{3}$	0
$\frac{\pi}{2}$	-2
$\frac{2\pi}{3}$	0

E.g. Graph $y = \sin(\pi x)$

x	$y = \sin x$
0	0
$\frac{\pi}{2}$	1
π	0
$\frac{3\pi}{2}$	-1
2π	0

x	$y = \sin(\pi x)$
0	0
$\frac{1}{2}$	1
1	0
$\frac{3}{2}$	-1
2	0

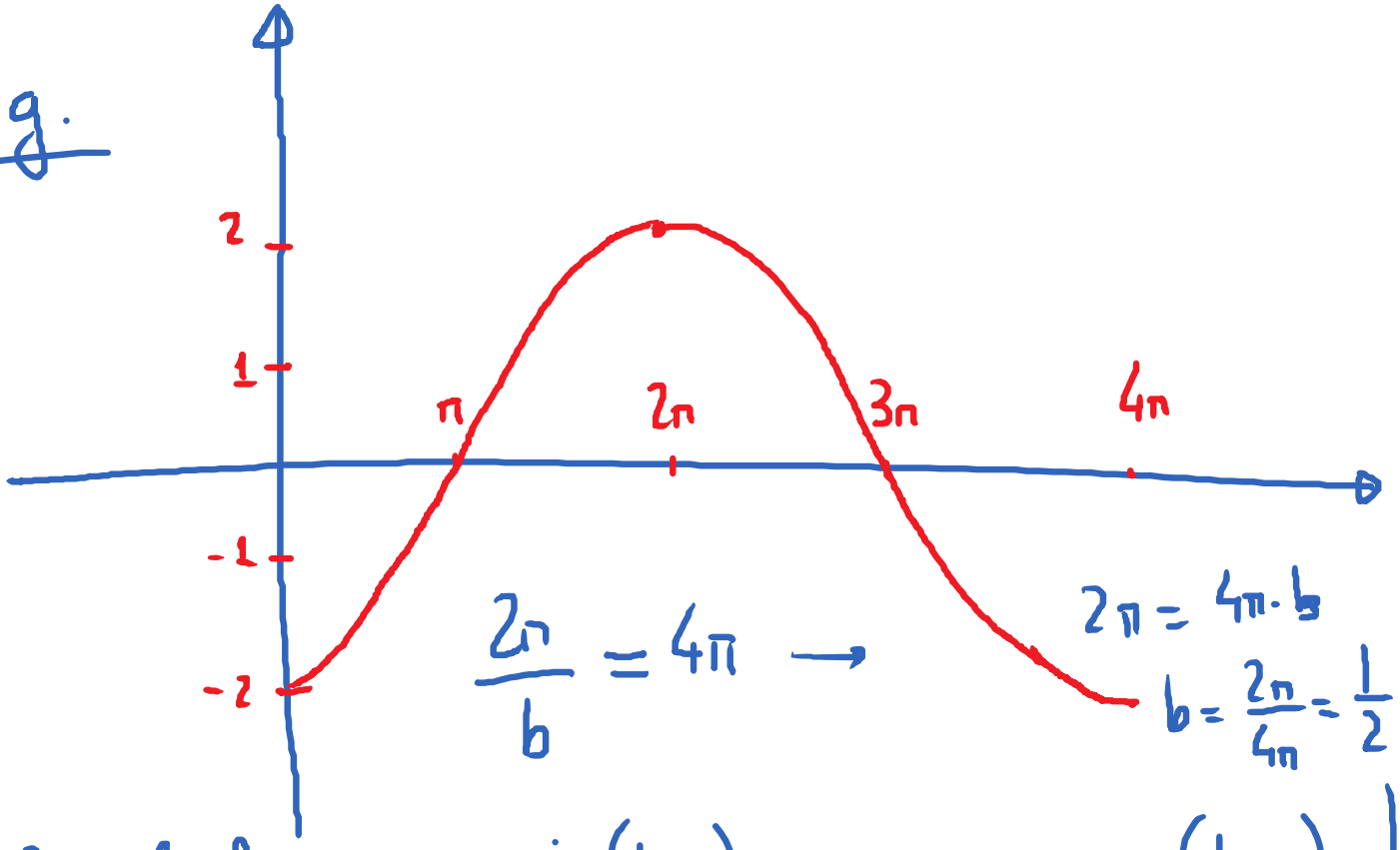


Ex. Graph $y = 3\cos\left(\frac{\pi}{2}x\right)$ in one period.

Find Amplitude and Period.

Solved!

E.g.



$\frac{2\pi}{b} = 4\pi \rightarrow$

$2\pi = 4\pi \cdot b$

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

Graph of $y = a\sin(bx)$ or $y = a\cos(bx)$

Which one? Find a and b. $a = -2$; $b = \frac{1}{2}$.

$y = -2\cos\left(\frac{1}{2}x\right)$