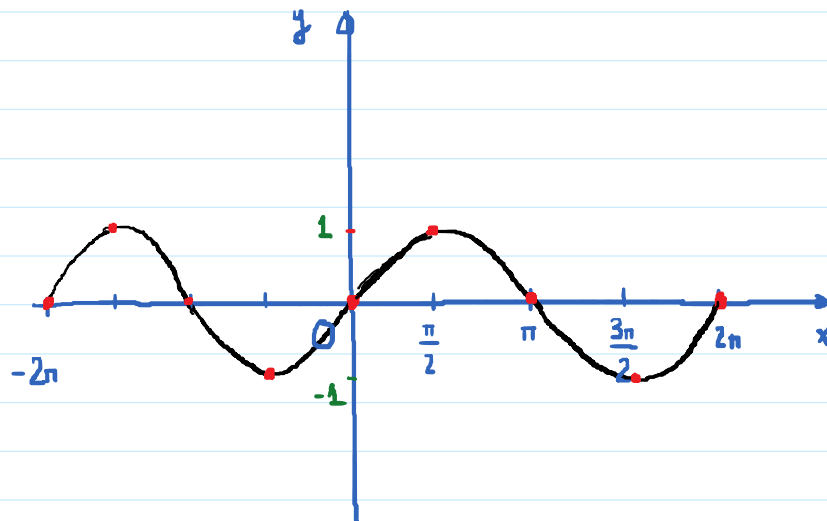


4.1. Graph of the sine and the cosine function

Monday, February 24, 2020 9:33 AM

Graph of the sine.

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



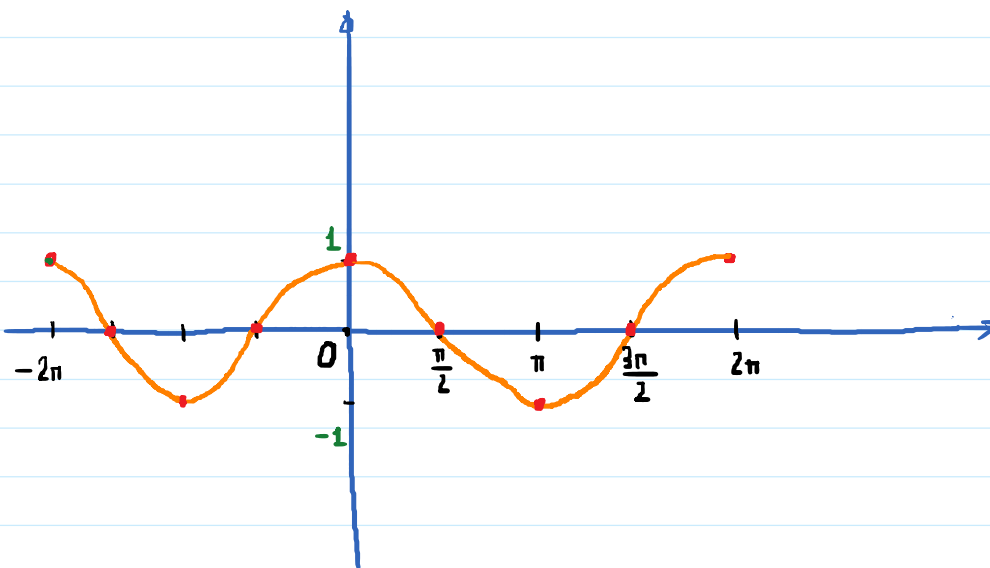
Sine function is periodic with period 2π .

In 1-cycle: Sine pattern: intercept - max - intercept - minimum - intercept

Domain = $(-\infty, \infty)$; Range = $[-1, 1]$. Period = 2π .

Graph of the cosine.

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



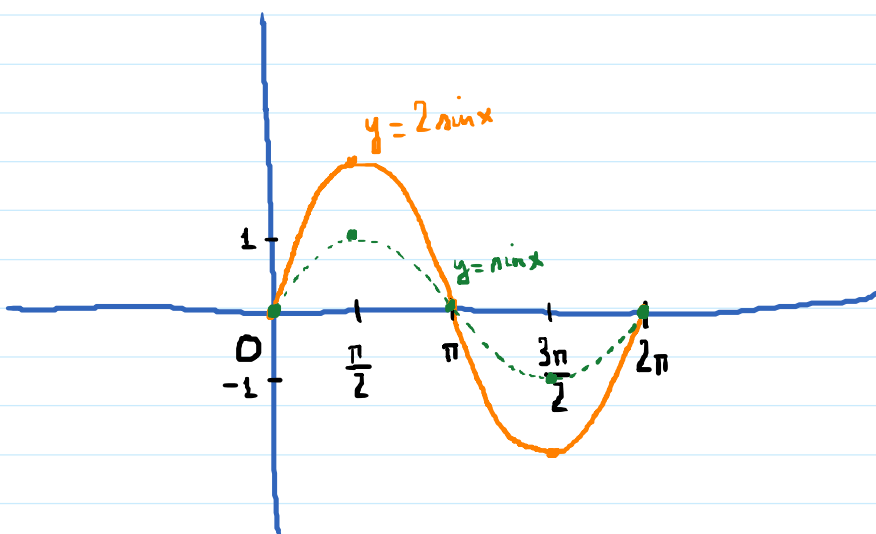
Cosine is periodic with period 2π .

In 1-cycle: max - intercept - min - intercept - max

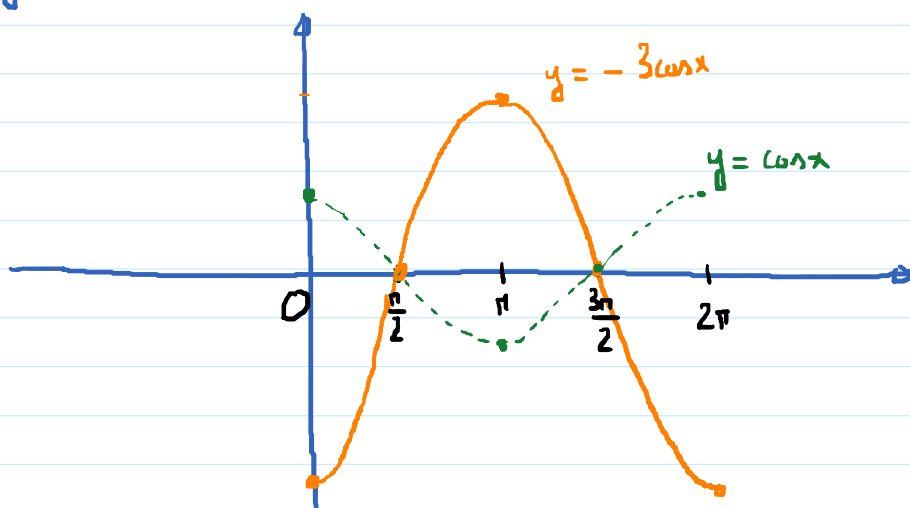
Domain = $(-\infty, \infty)$; Range = $[-1, 1]$; Period = 2π .

Graph of the form $y = a \sin x$ or $y = a \cos x$.

E.g. $y = 2 \sin x$. Graph in one-period.



$y = -3 \cos x$

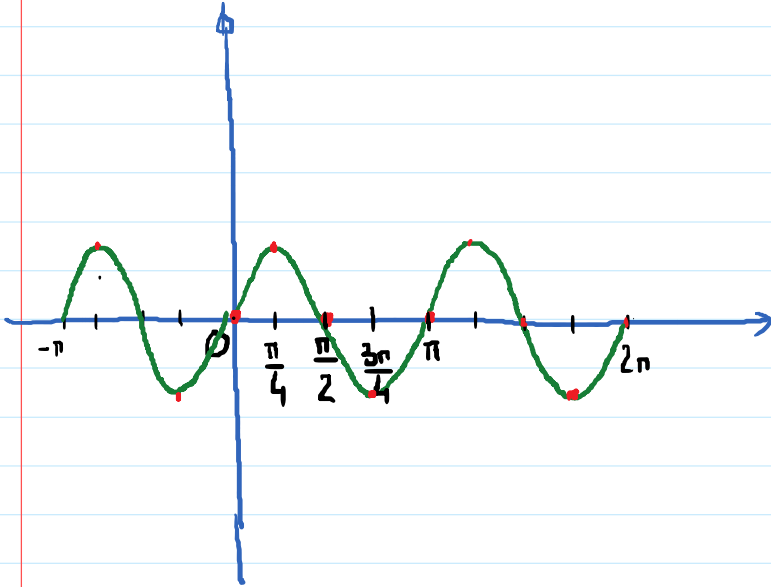


Graphs of the form: $y = \sin(bx)$ or $y = \cos(bx)$

E.g. $y = \sin(2x)$

$$2x = 0 \rightarrow x = 0$$

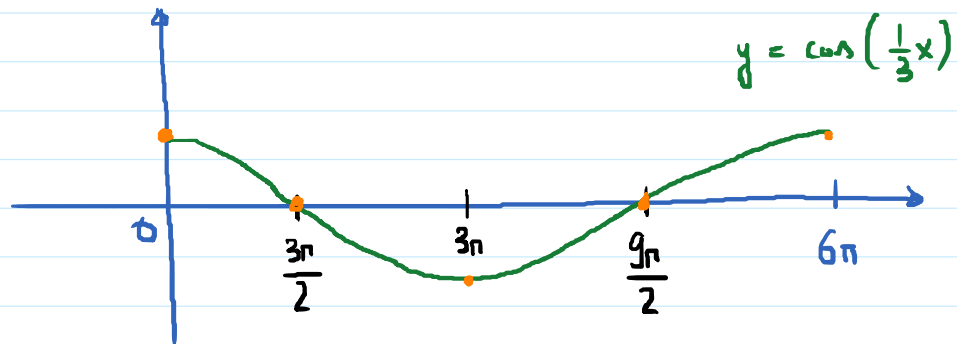
$$2x = 2\pi \rightarrow x = \pi$$



Graph $y = \cos\left(\frac{1}{3}x\right)$ in one-period

$$\frac{1}{3}x = 0 \rightarrow x = 0$$

$$\frac{1}{3}x = 2\pi \rightarrow x = 6\pi$$



Note: $y = \sin(bx)$; $y = \cos(bx)$

$$\text{Period} = \frac{2\pi}{b}$$

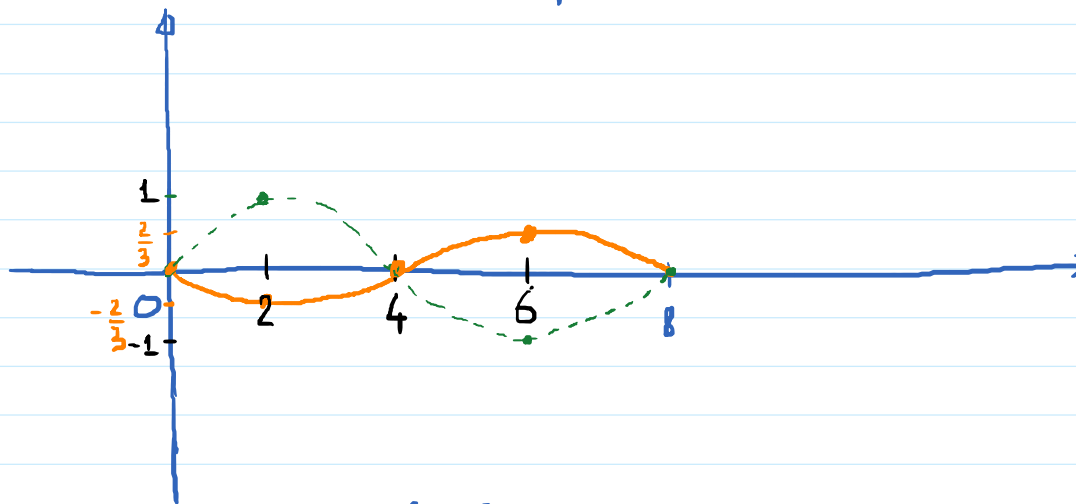
E.g. Graph $y = -\frac{2}{3} \sin\left(\frac{\pi}{4}x\right)$

$$\frac{\pi}{4}x = 0$$

$$\frac{\pi}{4}x = 2\pi$$

$$x = 0$$

$$x = \frac{2\pi}{\frac{\pi}{4}} = 2 \cdot \frac{4}{1} = 8$$



Note: $y = a \sin(bx)$

$$\text{Period} = \frac{2\pi}{b} ; \text{Amplitude} = |a|$$