Fourier Series

Periodic function A function $f(x)$ is said to be a periodic function if

$$f(x+T) = f(x)$$

where, T = be the period of the given function.

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

$$\therefore f(x+2\pi) = \sin(x+2\pi) = \sin x = f(x)$$

So 2π be the period of $\sin x$

The general form of Sinx/Cosx

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

and

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

where a = amplitude

$bx-c$ = angular momentum

d = shifting phase

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* The general form of $a\sin x/\cos x$

$f(x) = a\sin(\omega x)$ where $\omega = bx - c$ is angular momentum.

or $f(x) = a\cos(\omega x)$

where a = amplitude

$(bx - c) = \omega$ = angular momentum

T = period $= 2\pi/b = \frac{2\pi}{\omega}$.

Starting point $\Rightarrow bx - c = \omega = 0$

$\therefore \boxed{bx - c = 0}$

x-scale point $= \frac{\text{Period}}{4}$

Ending point $\Rightarrow bx - c = 2\pi \Rightarrow \omega = 2\pi$

$\therefore \boxed{bx - c = 2\pi}$

The above properties is used for graphing Sinusodial Function of the form

$$\boxed{y = A\sin(\omega x) = a\sin(bx - c)}$$

$$\boxed{y = A\cos(\omega x) = a\cos(bx - c)}$$

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Starting point $x = 0$, $f(0) = 4$

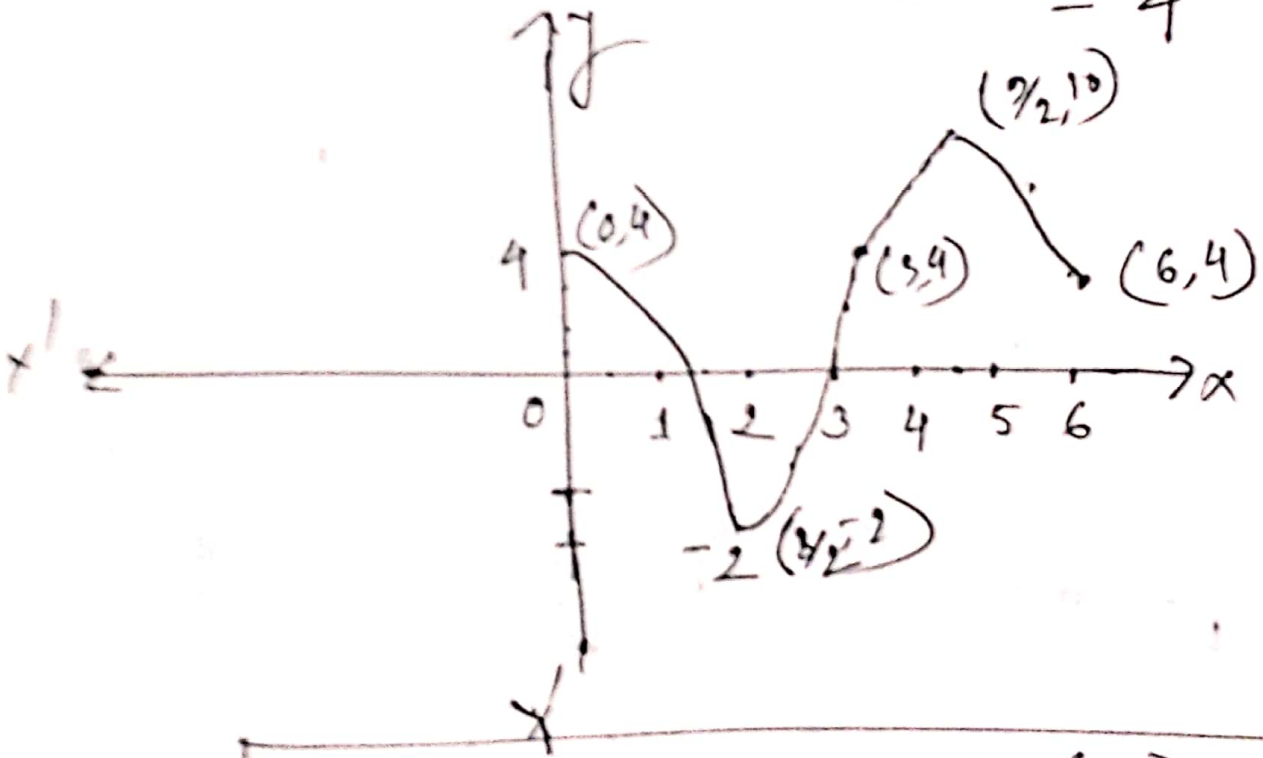
next point $0 + 3/2 = 3/2$ $\therefore f(3/2) = -6 + 4 = -2$

next point $3/2 + 3/2 = 3$ $\therefore f(3) = -6 \cdot 0 + 4 = 4$

next point $3 + 3/2 = 9/2$ $\therefore f(9/2) = 6 + 4 = 10$

next point $9/2 + 3/2 = 6$ $f(6) = -6 \cdot 0 + 4$

$= 4$



graph of $y = -6 \sin(\pi/3 x) + 4$

Domain $= (-\infty, \infty)$

Range $= [-2, 10]$

Starting point $= -\pi/2$; $f(-\pi/2) = -3\cos(-\pi+\pi)$

$= -3$

2nd point : starting point + x = scale point

$= \boxed{-\pi/2 + \pi/4 = -\pi/4}$

$\therefore f(-\pi/4) = -3\cos(2(-\pi/4)+\pi) = 0$

Next point : $\boxed{-\pi/4 + \pi/4 = 0}$

$\therefore f(0) = -3(\cos 0 + \pi) = 3$

Next point : $\boxed{0 + \pi/4 = \pi/4}$

$\therefore f(\pi/4) = -3\cos(2\cdot\pi/4 + \pi)$

$= -3\cos(3\pi/2) = 0$

Next point : $\boxed{\pi/4 + \pi/4 = 2\pi/4 = \pi/2}$

$\therefore f(\pi/2) = -3\cos(2\cdot\pi/2 + \pi)$

$= -3$.