Quiz 04 A01212611
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Series de Fourier

1. Encuentra el periodo fundamental para las siguientes funciones:

[a] $\cos(nx)$

- Let $f(x) = \cos(nx)$
- Then, $f\left(x + \frac{2\pi}{n}\right) = \cos\left(n\left(x + \frac{2\pi}{n}\right)\right)$ (wave number; wave length λ)

$$= \cos(nx + 2\pi)$$

$$= \cos(nx) \longrightarrow \cos(\theta + 2\pi) = \cos(\theta) = f(x)$$

- So, $f\left(x + \frac{2\pi}{n}\right) = f(x) \rightarrow \boxed{P = \frac{2\pi}{n}}$ // is the smallest positive that satisfies $f(x+p) = f(x)$

b $\sin(nx)$

- Let $f(x) = \sin(nx)$
- Then, $f\left(x + \frac{2\pi}{n}\right) = \sin\left(n\left(x + \frac{2\pi}{n}\right)\right)$

$= \sin(nx + 2\pi)$

$= \sin(nx) \longrightarrow \sin(\theta + 2\pi) = \sin(\theta) = f(x)$

- So, $f\left(x + \frac{2\pi}{n}\right) = f(x) \longrightarrow$ $p = \frac{2\pi}{n}$ // is the smallest positive that satisfies $f(x+p) = f(x)$

c $\cos\left(\frac{2\pi x}{k}\right)$ & $\sin\left(\frac{2\pi x}{k}\right)$

$k = \frac{2\pi}{k} \Rightarrow p = \frac{2\pi}{\left(\frac{2\pi}{k}\right)} = k$ //

d $\cos\left(\frac{2\pi n x}{k}\right)$ & $\sin\left(\frac{2\pi n x}{k}\right)$

$k = \frac{2\pi n}{k} \Rightarrow p = \frac{2\pi}{k} = \frac{k}{n}$ //