

1060 33233

No

Date

周 耶 3 月 4 日

Quiz 2

$$f(x) = x+5 \quad -10 < x < 10 \quad P=2L=10$$

 $\Rightarrow$  Odd func

$$f(x) = a_0 + \sum_{n=1}^{\infty} a_n \cos \frac{n\pi}{L} x + b_n \sin \frac{n\pi}{L} x$$

=

$$b_n = \frac{2}{L} \int_0^L f(x) \cdot \sin \frac{n\pi}{L} x \cdot dx$$

$$= \frac{2}{5} \int_0^5 (x+5) \cdot \sin \frac{n\pi}{5} x \cdot dx$$

$$= \frac{2}{5} \left[ (x+5) \cdot \frac{-\cos \frac{n\pi}{5} x}{\frac{n\pi}{5}} - \int \frac{-\cos \frac{n\pi}{5} x}{\frac{n\pi}{5}} \cdot dx \right] \Big|_0^5$$

$$= \frac{2}{5} \left[ (x+5) \cdot \frac{-\cos \frac{n\pi}{5} x}{\frac{n\pi}{5}} + \frac{\sin \frac{n\pi}{5} x}{(\frac{n\pi}{5})^2} \right] \Big|_0^5$$

$$= \frac{2}{5} \left[ (x+5) \cdot \frac{-5 \cos \frac{n\pi}{5} x}{n\pi} + \frac{25 \cdot \sin \frac{n\pi}{5} x}{(n\pi)^2} \right] \Big|_0^5$$

$$= \frac{2}{5} \left[ (10 \cdot \frac{-5 \cos n\pi}{n\pi} + \frac{25 \cdot \sin n\pi}{(n\pi)^2}) - \right.$$

$$\left. \left( 5 \cdot \frac{-5 \cos 0}{n\pi} + \frac{25 \sin 0}{(n\pi)^2} \right) \right]$$

$$= \frac{2}{5} \left[ \frac{-10}{\pi} \cdot \frac{\cos n\pi}{n} + \frac{25}{\pi} \cdot \frac{1}{n} \right]$$

$$= \frac{2}{5} \times 5 \left[ -2 \cdot \frac{\cos n\pi}{n} + \frac{1}{n} \right] = \frac{10}{\pi} \left[ -2 \cdot \frac{\cos n\pi}{n} + \frac{1}{n} \right]$$

$$f(x) = \frac{10}{\pi} \sum_{n=1}^{\infty} \left( -2 \frac{\cos n\pi}{n} + \frac{1}{n} \right) \sin \frac{n\pi}{5} x$$