

國立台灣海洋大學 2005 河工系工程數學(二) 第二次作業解答

13.5

$$2.(a) f(x) = \frac{1}{2} - \frac{4}{\pi^2} \sum_{n=1}^{\infty} \frac{1}{(2n-1)^2} \cos[(2n-1)\pi x]$$

$$(b) f'(x) = \frac{4}{\pi^2} \sum_{n=1}^{\infty} \frac{1}{(2n-1)^2} \sin[(2n-1)\pi x]$$

$$(c) b_n = \frac{2}{n\pi} [1 - (-1)^n]$$

13.6

$$12. f(x) = \frac{k}{2} + \frac{2k}{\pi} \sum_{n=1}^{\infty} \frac{1}{(2n-1)} \sin[(2n-1)\pi x]$$

$$\text{Phase angle is } \frac{k}{2} + \frac{2k}{\pi} \sum_{n=1}^{\infty} \frac{1}{(2n-1)} \cos[(2n-1)\pi x - \frac{\pi}{2}]$$

$$15. RMS_f = \left[\frac{\omega}{2\pi} \int_0^{2\pi} [E \sin(\omega x)]^2 dx \right]^{\frac{1}{2}} = \sqrt{\frac{E}{2}}$$

13.7

$$5. f(x) = \frac{1}{2} + \frac{3i}{\pi} \sum_{n=-\infty}^{\infty} \frac{1}{(2n-1)} e^{\frac{(2n-1)\pi i x}{2}}, \text{ and converges to}$$

$$g(x) = \begin{cases} \frac{1}{2} & \text{for } x = 0, 2, 4 \\ -1 & \text{for } 0 < x < 2. \\ 2 & \text{for } 2 < x < 4 \end{cases}$$

12.

