

國立臺灣海洋大學河海工程學系 2001 工程數學 (三) 第四次作業小考

$$1. f(x) = \begin{cases} 0 & -1 < x < 0 \\ x & 0 < x < 1 \end{cases}, x \in [-1, 1]$$

(a) please use the Fourier series to expand $f(x)$ and plot the function.

ie.

$$y(x) = \sum_{n=1}^3 \left[a_n \cos \frac{2n\pi x}{T} + b_n \sin \frac{2n\pi x}{T} \right]$$

where $T=2$

(b) Please use the Legendre polynomial to expand $f(x)$ and plot the function.

ie.

$$y(x) = \sum_{i=0}^6 C_i P_i(x)$$

where $P_i(x)$ is i th order Legendre polynomial.

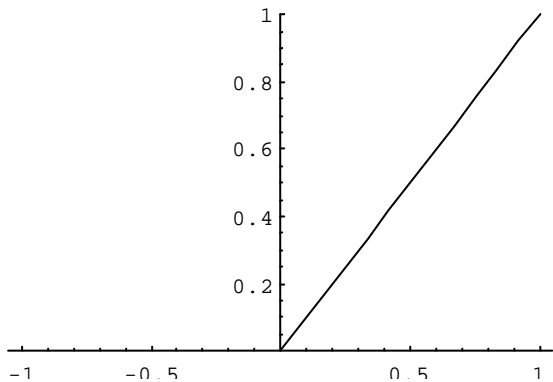


FIGURE 1. : $f(x) = \begin{cases} x & x > 0 \\ 0 & x \leq 0 \end{cases}$

2. Compare the accuracy of Fourier series and Legendre polynomial.