

HOMEWORK #6 (12.1 ~12.2)

Due on April 19

- 1) Show the given set of functions is orthogonal on the indicated interval. Find the norm of each function in the set. (Problem 12, page 656)

$$\left\{ 1, \cos \frac{n\pi}{p} x, \sin \frac{m\pi}{p} x \right\}, \quad n = 1, 2, 3, \dots, \quad m = 1, 2, 3, \dots; [-p, p]$$

- 2) Verify by direct integration that the functions are orthogonal with respect to the indicated weight function on the given interval (Problem 13, page 656)

$$H_0(x) = 1, H_1(x) = 2x, H_2(x) = 4x^2 - 2; \quad w(x) = e^{-x^2}, (-\infty, \infty)$$

- 3) Find the Fourier series of  $f$  on the given interval ( Problem 7, page 661)

$$f(x) = x + \pi, \quad -\pi < x < \pi$$

- 4) Use the result of 3) to show ( Problem 19, page 661)

$$\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \dots$$