

Math 164 - HW 6

HW 6 Assignment to be placed in Notebook, may be collected on 3/10/05.
Call for Presentations begins immediately.

1. Find and Plot Fourier Sine Series for $f : [0, 1] \rightarrow \mathbb{R}$ defined by:

$$(a) f(x) = \begin{cases} x & x < \frac{1}{2} \\ 1 - x & x \geq \frac{1}{2} \end{cases}.$$

$$(b) f(x) = \sin(2\pi x) + \frac{1}{100} \sin(10\pi x).$$

$$(c) f(x) = (x - \frac{1}{2})^2.$$

2. Using the inner product $\langle u, v \rangle = \int_{-1}^1 u(x)v(x) dx$ for the space $L^2((-1, 1), \mathbb{R})$ of square-integrable functions on the interval $(-1, 1)$,

(a) Perform Gram-Schmitt orthonormalization process on $\{1, x, x^2, x^3, \dots\}$.

(b) Expand $f : (-1, 1) \rightarrow \mathbb{R}$ defined by $f(x) = e^x$ in terms of this basis, i.e., compute $P_X f$ for $X = \text{span}\{1, x, x^2, x^3, \dots\}$.