

# Homework #3: Phys 3320: Prof. Olness Fall 2010

**Due Oct. 19, 2010**

*Hint: Use the sample mathematica file posted on the web page:*

<http://www.physics.smu.edu/~olness/www/10fall11320/3320/>

1) By trial and error, find the coefficients  $\{c_0, c_1, c_2, c_3\}$  of the following series,

$$f(x) = c_0 + c_1 \sin(2\pi \cdot 1 \cdot x) + c_2 \sin(2\pi \cdot 2 \cdot x) + c_3 \sin(2\pi \cdot 3 \cdot x)$$

to fit the function

$$f(x) = x$$

on the interval  $x \in [0, 1]$ .

Plot your results with the exact function.

2) By trial and error, find the coefficients  $\{c_0, c_1, c_2, c_3\}$  of the following series,

$$f(x) = c_0 + c_1 \sin(2\pi \cdot 1 \cdot x) + c_2 \sin(2\pi \cdot 2 \cdot x) + c_3 \sin(2\pi \cdot 3 \cdot x)$$

to fit the function

$$f(x) = 0 \text{ for } x \in [0, 1/2] \text{ and } f(x) = 1 \text{ for } x \in [1/2, 1]$$

on the interval  $x \in [0, 1]$ .

Plot your results with the exact function.

3) By trial and error, find the coefficients  $\{c_0, c_1, c_2, c_3\}$  of the following series,

$$f(x) = c_0 + c_1 \sin(2\pi \cdot 1 \cdot x) + c_2 \sin(2\pi \cdot 2 \cdot x) + c_3 \sin(2\pi \cdot 3 \cdot x)$$

to fit the function

$$f(x) = 1 - |x|$$

on the interval  $x \in [-1, 1]$ . ( $|x|$  is the Abs(x).)

Plot your results with the exact function.

Comment on your answer.