Homework #5: Phys 3344: Prof. Olness Fall 2020

Due 23 September 2020

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

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

$$f(x) = c_0 + c_1 \text{Sin}(2\pi \bullet 1 \bullet x) + c_2 \text{Sin}(2\pi \bullet 2 \bullet x) + c_3 \text{Sin}(2\pi \bullet 3 \bullet x)$$

to fit the function

$$f(x)=x$$

on the interval x=[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,

$$f(x) = c_0 + c_1 \text{Sin}(2\pi \bullet 1 \bullet x) + c_2 \text{Sin}(2\pi \bullet 2 \bullet x) + c_3 \text{Sin}(2\pi \bullet 3 \bullet x)$$

to fit the function

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

on the interval x=[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,

$$f(x) = c_0 + c_1 \text{Sin}(2\pi \bullet 1 \bullet x) + c_2 \text{Sin}(2\pi \bullet 2 \bullet x) + c_3 \text{Sin}(2\pi \bullet 3 \bullet x)$$

to fit the function

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

on the interval x=[-1,1]. (|x| is the Abs(x).)
Plot your results with the exact function. Comment on your answer.

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4) Compute the Fourier Coefficients for: f(x)=x on the interval x=[0,2π]

5) Compute the Fourier Coefficients for: f(x)=1 on the interval x=[0,π] and f(x)=0 for x=[π,2π].

6) Compute the Fourier Coefficients for: f(x)=Sin[x] on the interval x=[0,π] and f(x)=0 for x=[π,2π].