PHYS 301
HOMEWORK #5

Due : 22 Feb. 2017

For this homework assignment, you may use Mathematica to compute integrals. If you use Mathematica, please print out your output and attach to this homework. Mathematica is the only software you may use on this (and all other assignments this term).

1. Felder and Felder, 9.61, p. 471.

2. Felder and Felder, 9.62, p. 471

3. Felder and Felder, 9.65, p. 471

4. Do all 7 parts of the discovery problem 9.4 .1 on p. 459.

5. The function

$$f(x) = \begin{cases} 1, & 0 < x < 1/2 \\ -1, & 1/2 < x < 1 \end{cases}$$

is periodic. Find the Fourier coefficients for this function, and write out the first three non zero terms of each series.

6. The function :

$$f(x) = \begin{cases} 10, & 0 < x < 10 \\ 20, & 10 < x < 20 \end{cases}$$

is periodic. Find the Fourier coefficients for this function, and write out the first three non zero terms of each series.

7. A string of length L is plucked at its middle; the maximum height of the string is h. Find the Fourier sine series that will describe this shape (a problem we have to solve to find the modes of vibration of a string plucked at its middle). The diagram below uses specific numbers to generate a Plot, you should use L and h as your variables.