PHYS 301 HOMEWORK #4

Due: 13 Feb. 2015

1. Problem 9 - 24 from the text (p. 371). You may use Mathematica to solve integrals for this problem as long as you write the code yourself (in other words, you may use my posted code to verify your results, but you must submit your own Mathematica output as part of your homework). Make sure you attach your output with your homework.

2. Problem 10 - 1 from the text (p. 373). For this problem, do the integrals by hand, and show your expressions for the Fourier coefficients. Verify the relative intensities given by the text (remember that intensity varies as the square of the amplitude).

3. Problem 10 - 2 from the text (p. 373). For this problem, do the integrals by hand, and show your expressions for the Fourier coefficients. Find the relative intensitives for the first eight overtones (i.e., for $1 \le n \le 8$)

4. Problem 10 - 5 from the text (p. 374). Be sure you have the correct functional form for the sine wave between (0 < t < 1/120). You may use Mathematica to solve integrals for this problem as long as you write the code yourself (in other words, you may use my posted code to verify your results, but you must submit your own Mathematica output as part of your homework). Make sure you attach your output with your homework. The answer in the back is correct; is this answer consistent with the statement of the problem?

5. For the function

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

find the complex Fourier series and verify that this is equivalent to the answer to problem 5 - 7 on p. 355. Do the integrals by hand.