PHYS 301
HOMEWORK #3

Due : 6 Feb. 2013

For this homework assignment, you may use Mathematica to help compute integrals; if you do, submit your Mathematica output with your homework.

For problems 1 - 3 find the complex Fourier series for the functions indicated. Calculate the Fourier coefficients and write out the first three non - zero pairs of terms of the series.

1. $f(x) = x^2, \; -\pi < x < \pi$

2. $f(x) = \text{Abs}[x], \; -\pi < x < \pi$

3. $f(x) = e^{a\,x}, \; -\pi < x < \pi$ (a is a real number)

For problems 4 - 7, find the trigonometric Fourier series for the functions indicated; be sure to take into account the interval specified. Calculate the Fourier coefficients and write out the first three non - zero terms.

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

5. $f(x) = \sin(x/2), \; 0 < x < 2\pi$

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

7. $f(x) = \begin{cases} 0, & -3 < x < 0 \\ 1, & 0 < x < 1 \end{cases}$

8. Use Mathematica to plot your Fourier Series for the interval $-7 < x < 5$. Submit your output with your homework.