Homework #5
Due Date: Feb. 14, 2005

1. O&W 3.28.

2. (a) For the function in Figure P3.28(b), use Matlab to numerically determine the Fourier series coefficients for $0 \leq k \leq 5$. Compare to analytic determination from problem 1.

(b) Matlab’s FFT function implements the following formula: $X(k) = \sum_{n=0}^{N-1} x(n)e^{-i\frac{2\pi}{N}nk}$.

Also, Use Matlab’s FFT function and determine fft(x)/N. Compare to part a.

3. O&W 3.31

4. O&W 3.35

5. O&W 3.36

6. Consider the function $x(n) = \cos(\omega_0 n) + 2\cos(3\omega_0 n)$ where $\omega_0 = \frac{2\pi}{16}$.
   
   a. What is the fundamental period ($N$) and what are the Fourier Series coefficients?
   
   b. Create about several periods of this function and apply as an input to the function f4.m. Plot the input and output signals.
   
   c. Determine the impulse response to f4.m and from that determine the frequency response of the system, $H(e^{j\omega_0})$, for $k = 0, 1, 2, 3$.
   
   d. Use the result of part c. to determine the periodic output function and plot several periods of this function. Compare to the result of part b.