

Homework #4

Due Date: Feb. 8, 2005

1. O&W 3.22. For part a, do only Figure P3.22(e & f) (hint use result of Example 3.5 and apply the shift theorem). Do part b as well.
2. Consider the periodic signal in Figure P3.22(e). In Matlab, determine the Fourier series coefficients by using numerical integration. Compare the results to those of problem 1 for $k = 0, 1, 2, 3, 4, 5$.
3. O&W 3.24
4. O&W 3.25
5. O&W 3.40
6. O&W 3.46(a)
7. Consider a continuous time system with impulse response $h(t) = \exp(-\alpha t)u(t)$ and a periodic input function $x(t) = \begin{cases} 1 & t < 1 \\ 0 & 1 \leq t \leq T \end{cases}$, where the period is $T = 4$. Determine the output of this system by first determining the FS representation of the input signal and then determining the system response of to $\exp(jk\omega_0 t)$. Using Matlab, plot at least two periods of the input and output functions for using a_k for $|k| \leq 21$.
8. Consider the periodic signal in Example 3.7. Using Matlab, plot at least two periods of the Fourier series expansion of this signal using a_k , for a) $k = 0$, b) $|k| \leq 1$, c) $|k| \leq 3$, d) $|k| \leq 5$, and e) $|k| \leq 21$.