Homework No. 5
Due 11:10am, May 4, 2006

3.50 Use the defining equation for the Fourier series coefficients to evaluate the Fourier series representation of the following signals: (20%)

(c) $x(t) = \sum_{m=-\infty}^{\infty} e^{j\frac{2\pi}{7}m}\delta(t - 2m)$

(d) $x(t)$ as depicted in Figure P3.50(a) of the textbook.

3.51 Use the definition of the Fourier series to determine the time-domain signals represented by the following Fourier series coefficients: (20%)

(c) $X[k] = (\frac{-1}{3})^{|k|}$, $\omega_0 = 1$

(d) $X[k]$ is depicted in Figure P3.51(a) of the textbook, $\omega_0 = \pi$.

3.54 Use the defining equation for the Fourier transform to evaluate the frequency-domain representations of the following signals: (20%)

(c) $x(t) = te^{-t}u(t)$

(d) $x(t) = \sum_{m=0}^{\infty} a^m \delta(t - m)$, $|a| < 1$.

3.67 Find the frequency response and the impulse response of the system having the output $y(t)$ for the input $x(t)$: (20%)

(b) $x(t) = e^{-3t}u(t)$, $y(t) = e^{-3(t-2)}u(t - 2)$

(f) $x(t) = e^{-2t}u(t)$, $y(t) = 2(t - 2)e^{-2(t-2)}u(t - 2)$.

3.77m For the $X(\omega)$ shown in Figure P3.77, if $x(t) \xleftrightarrow{\mathcal{F}} X(\omega)[u(\omega + 3) - u(\omega - 1)]$, please evaluate the following quantities. (20%)

(a) $\int_{-\infty}^{\infty} x(t)dt$

(b) $\int_{-\infty}^{\infty} |x(t)|^2 dt$

(c) $\int_{-\infty}^{\infty} x(t)e^{-jt}dt$

(d) $\arg\{x(t)\}$

(e) $x(0)$