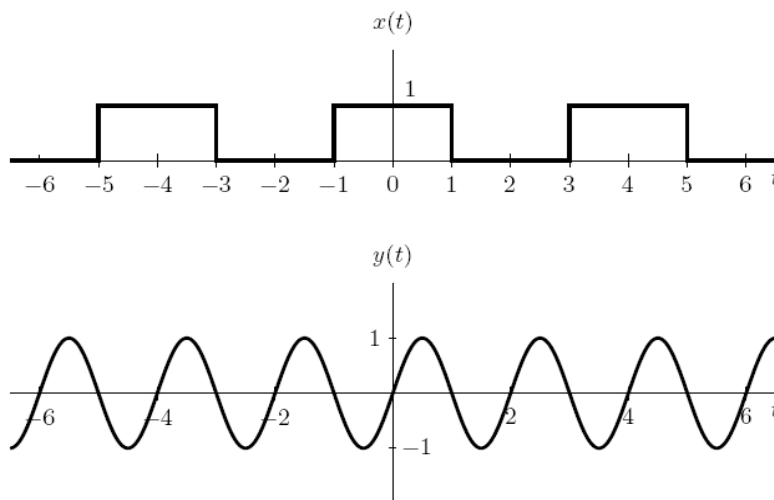


Homework No. 4

Due 13:10, Nov. 23, 2011

1. Consider the following continuous-time periodic signals, $x(t)$, $y(t)$.



- (1) Determine the fundamental period, frequency, and Fourier series coefficients $X[k]$ for $x(t)$. (10%)
 - (2) Determine the fundamental period, frequency, and Fourier series coefficients $Y[k]$ for $y(t)$. (10%)
2. Determine the time-domain signals represented by the following Fourier series coefficients:
- (1) $X[k] = j\delta[k-1] - j\delta[k+1] + \delta[k-3] + \delta[k+3]$, $\omega_0 = 2\pi$. (10%)
 - (2) $X[k] = \left(\frac{-1}{3}\right)^{|k|}$, $\omega_0 = \pi$. (10%)
3. Find the impulse response and the frequency response of the systems with input $x(t)$ and output $y(t)$:
- (1) $x(t) = e^{-t}u(t)$, $y(t) = [e^{-2t} + e^{-3t}]u(t)$ (15%)
 - (2) $x(t) = e^{-2t}u(t)$, $y(t) = 2(t-2)e^{-2(t-2)}u(t-2)$ (15%)
4. Use the tables of transforms and properties to find the Fourier transforms or the inverse Fourier transforms of the following signals: (30%)
- (1) $x(t) = \sin(2\pi t)e^{-t}u(t)$
 - (2) $x(t) = \left[\frac{\sin(2\pi t)}{\pi t} \right] \left[\frac{2\sin(3\pi t)}{\pi t} \right]$
 - (3) $X(\omega) = \frac{j\omega}{(1+j\omega)^2}$