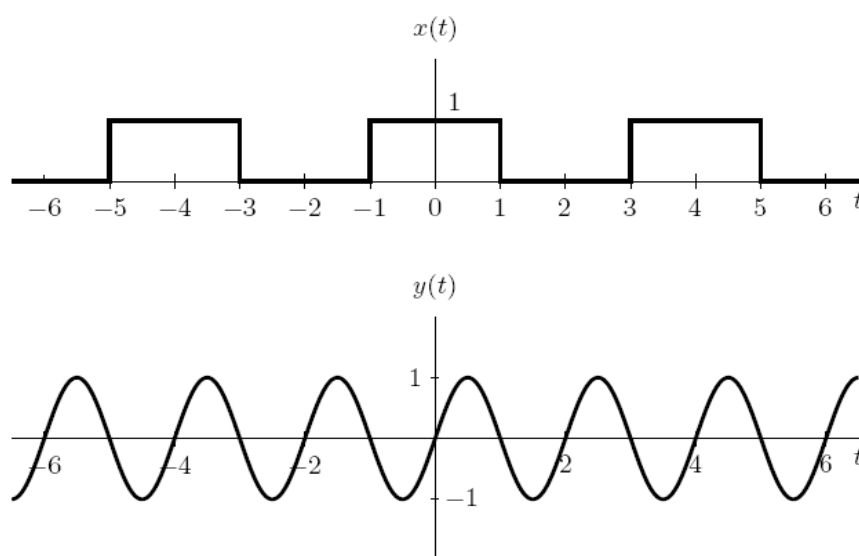


Homework No. 4

Due 18:10, April 23, 2009

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



- (1) Determine the fundamental frequency, period, and Fourier series coefficients, $X[k]$, for $x(t)$. (10%)
- (2) Determine the fundamental frequency, period, and Fourier series coefficients, $Y[k]$, for $y(t)$. (10%)

2. Determine the time-domain signals represented by 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) $x(t) = e^{-t}u(t)$, $y(t) = [e^{-2t} + e^{-3t}]u(t)$ (10%)

(2) $x(t) = e^{-2t}u(t)$, $y(t) = 2(t-2)e^{-2(t-2)}u(t-2)$ (10%)

4. Use the tables of transforms and properties to find the Fourier transforms or the inverse Fourier transforms of the following signals: (40%)

(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) $X(\omega) = \frac{d}{d\omega} \left[4\sin(4\omega) \frac{\sin(2\omega)}{\omega} \right]$ (4) $X(\omega) = \frac{j\omega}{(1+j\omega)^2}$