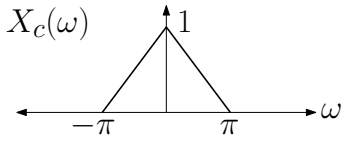
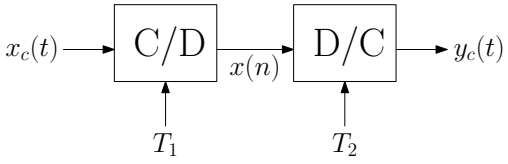
TEL 311E – Homework 4

Due 29.11.2010

1. Let $x_c(t)$ be a continuous-time bandlimited signal whose Fourier Transform is :



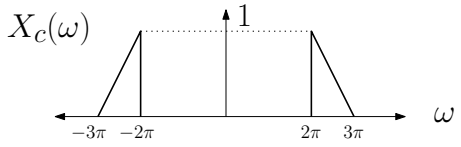
Consider the system composed of a C/D converter followed by a D/C converter.



(a) For a C/D sampling period of 2 sec ($T_1 = 2$), find $X(e^{j\omega})$.

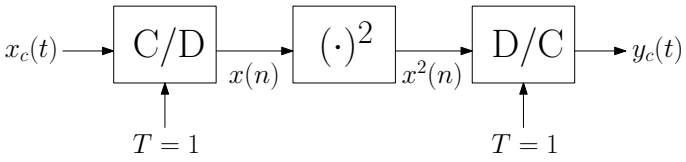
(b) For a D/C sampling period of $T_2 = 1$ sec, determine $Y_c(\omega)$, the Fourier transform of $y_c(t)$.

2. Repeat Question-1 for an input whose Fourier transform is



and $T_1 = 1$, $T_2 = 1$. Determine $X(e^{j\omega})$ and $Y_c(\omega)$.

3. Suppose we apply the following system to $x_c(t)$.



(a) For $x_c(t)$, a bandlimited signal whose Fourier transform is

$$X_c(\omega) = \begin{cases} 1 & \text{if } |\omega| \le \pi/2, \\ 0 & \text{if } |\omega| > \pi/2, \end{cases}$$

determine $Y_c(\omega)$. How is $y_c(t)$ related to $x_c(t)$?

(b) Repeat part (a) for

$$X_c(\omega) = \begin{cases} 1 & \text{if } |\omega| \le \pi, \\ 0 & \text{if } |\omega| > \pi. \end{cases}$$