In the Name of God, the Merciful, the Compassionate

Signals and Systems – CE Department – Sharif University of Technology
Fall 2007 – Homework on Sampling and Communication Systems

Chapter 7 and 8
Due : 1386/10/9

1) Solve following questions from the book

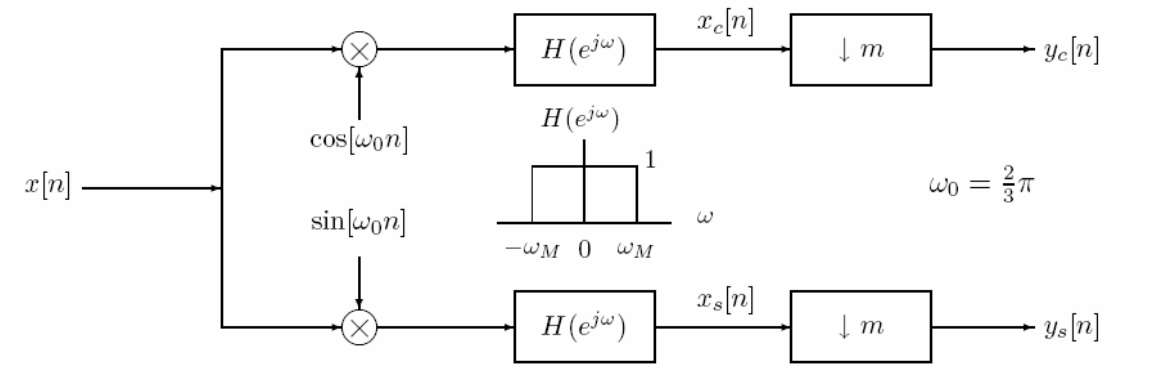
Chapter 7 :

- 7.21
- 7.24
- 7.27
- 7.28
- 7.31
- 7.41

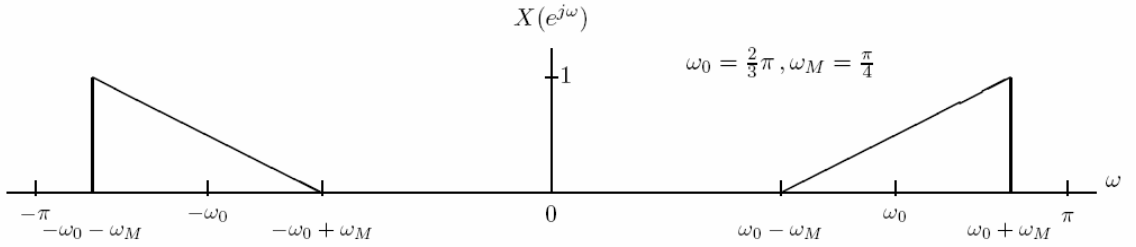
Chapter 8 :

- 8.18
- 8.28
- 8.40
- 8.46

2) Consider a system with following block diagram :



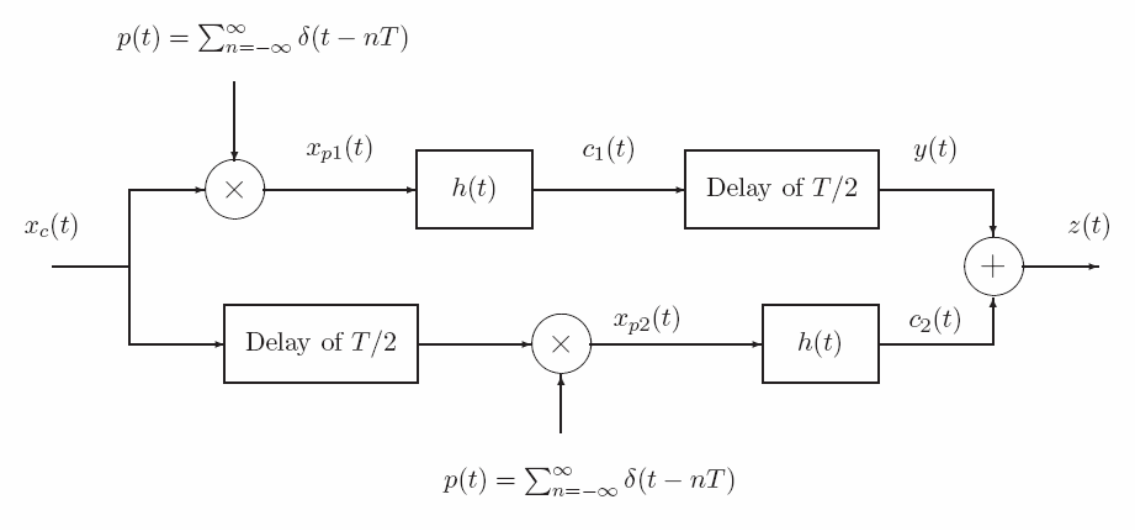
Where $\downarrow$ m and $\uparrow$m means down-sampling and up-sampling with rate m, respectively.
x[n] is a real-valued signal with following fourier transform :



which is depicted in $-\pi<\omega<\pi$.

a) Sketch fourier transform of $x_s[n]$ and $x_c[n]$.
b) How much can one down-sample without aliasing? (what is the maximum integer value of the m?)
c) Design a system which recovers the signal x[n] from $y_c[n]$ and $y_s[n]$.

3) Consider the following system :



Determine fourier transform of z(t) in terms of $X_c(j\omega)$ when $h(t)=\sin(2\pi t/T)/(\pi t)$.