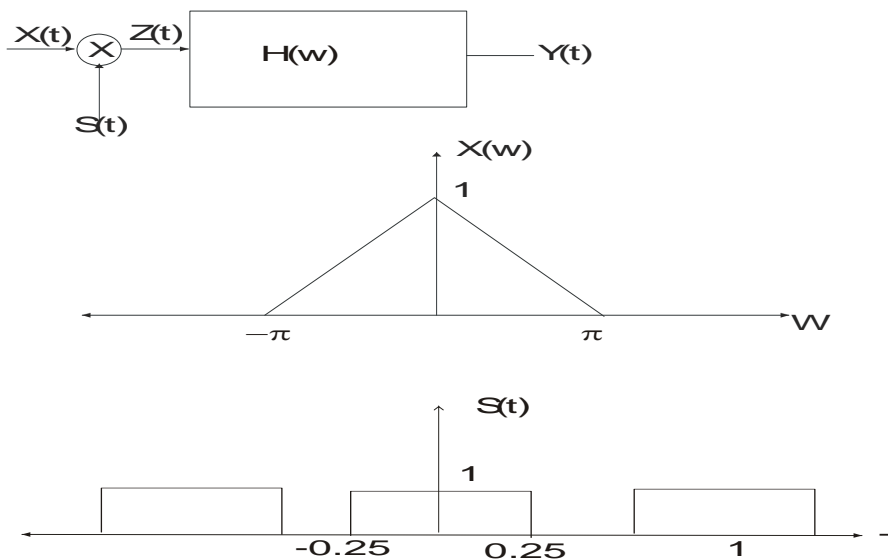


ECE 366 HW #7
Fall 2008
Due 10/31/08

- Office Hours: MW 3:30-5:00 p.m.
- The following questions are from Lathi's book, Second Edition.
- Read Chapter 7.4-7.7
- You should turn in your solutions to all of the problems.

1. [20] 7.4-3
2. [10] 7.7-1 (ii) (a),(b)
3. [20] 7.7-5
4. [10] 7.6-6
5. [20] Consider the following system in the figure. This system replaces analog multiplication with switching operation. In the figure shown below, $x(t)$ is bandlimited with bandwidth equal to π rad/sec. $s(t)$ is a periodic rectangular waveform with period equal to 1 sec.
 - a) Find the Fourier transform of $s(t)$.
 - b) Find an expression for $Z(\omega)$ in terms of $X(\omega)$ and sketch $Z(\omega)$.
 - c) Given that the output $y(t) = 2x(t) \cos(2\pi t)$, determine the type, gain and cutoff frequencies of the filter $H(\omega)$.



6. [20] Consider the periodic continuous-time signal $x(t) = |\cos(20\pi t)|$:
- Find the Fourier transform of $x(t)$. Sketch the magnitude response. Label the amplitude and the frequency axes.
 - Using your answer from part (a), determine the exponential Fourier Series coefficients, C_k , for $x(t)$.
 - Design a filter with frequency response, $H(\omega)$, such that when this signal is passed through, the output is $\cos(80\pi t + \frac{\pi}{4})$. Determine the magnitude and phase response of $H(\omega)$. What type of filter does this correspond to?