HW #6

1-In the system shown in Figure 1, two functions of time, $x_1(t)$ and $x_2(t)$, are multiplied together, and the product $w(t)$ is sampled by a periodic impulse train. $x_1(t)$ is band limited ω_1, and $x_2(t)$ is band limited to ω_2 . Determine the maximum sampling interval T such that $w(t)$ is recoverable from $w_p(t)$ through the use of an ideal low pass filter.

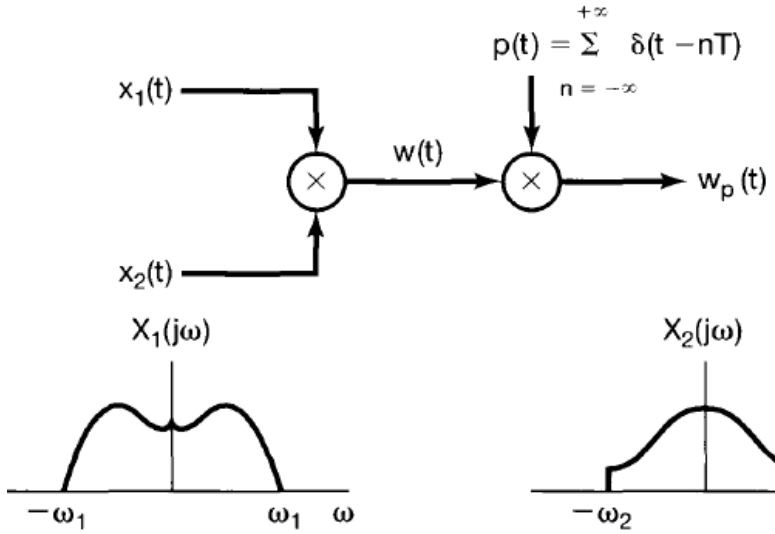

Figure 1

2-Figure 2 shows a system for amplitude modulation. The system consists of squaring the *sum* of the modulating signal and the carrier and then band pass filtering to obtain the amplitude modulated signal. Assume that $x(t)$ is band limited, so that $X(j\omega) = 0$, $|\omega| > \omega_M$ Determine the bandpass filter parameters A, ω_l, and ω_h such that $y(t)$ is an amplitude modulated version of $x(t)$ [i.e., such that $y(t) = x(t) \cos \omega_C t$]. Specify the necessary constraints, if any, on ω_C and ω_M.

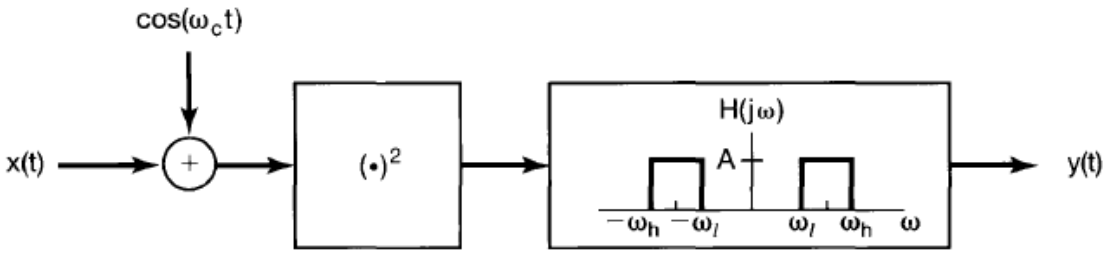

Figure 2

3- Consider the following transformation from $x(t)$ to $y(t)$ shown in Fig.3. Determine an expression for $y(t)$ when $x(t) = \sin(\pi t/2)/(\pi t)$. where $p(t) = \sum_{-\infty}^{\infty} \delta(t-k)$

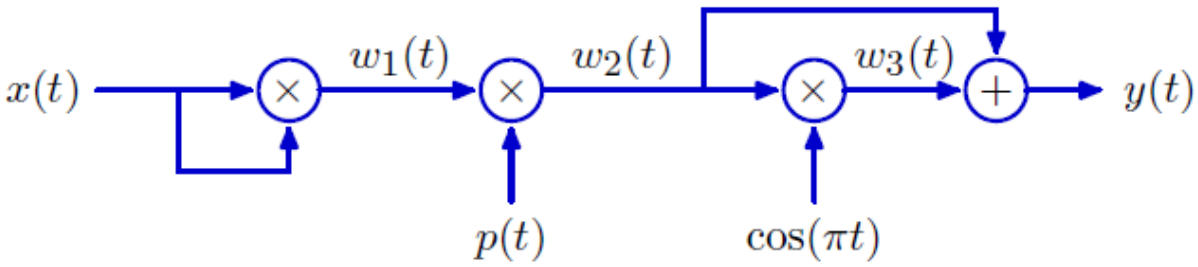

Figure 3