Solve the following problems from Oppenheim:

1. 7.23)
2. 7.26)
3. 7.30)

4. The signal $x(t)$ with maximum frequency component $\omega_x$ is multiplied by the modulation signal $y(t)$ with maximum frequency component $\omega_y = 2\omega_x$ giving the time domain signal $z(t)$.

   a) Find the maximum frequency component of $z(t)$.

   b) Find the maximum sampling interval $\Delta t$ for the impulse train $p(t)$ which when multiplied by $z(t)$ will produce the signal $z_s(t)$ without aliasing. Sketch a possible sampled signal of $z_s(t)$ from $-10\omega_x <= \omega <= 10\omega_x$ showing important frequency values.

   c) Design an ideal low pass filter $h(t)$ which could recover the original signal $z(t)$, from the sampled signal $z_s(t)$. Give the magnitude response of this filter in the frequency domain. Using a block diagram, sketch this system.