1. 6.3 from Ziemer and Tranter.

2. In a broadcasting communication system the transmitter power is 40kW, the channel attenuation is 80 dB, and the noise-power-spectral density is $10^{-10} W / Hz$.

The message signal has a bandwidth of $10^4$ Hz.

   a) Find the predetection SNR for DSB and SSB.
   b) Find the output SNR if the modulation is DSB.
   c) Find the output SNR if the modulation is SSB.

3. Suppose that the predetection filter for an upper sideband SSB signal actually passes $f_c - W/4 \leq |f| \leq f_c + W$ instead of $f_c - |f| \leq f_c + W$ as discussed in class.

   a. Sketch the power spectral density of the noise at the output of the receiver?
   b. Show that the output SNR will be about 1dB less than the value found for the standard SSB in class.

4. The received signal $r(t)=s(t)+n(t)$ in a communication system is passed through an ideal LPF with bandwidth $W$ and unity gain. The signal component $s(t)$ has a power spectral density $S_s(f) = \frac{P_0}{1+(f/B)^2}$. The noise component $n(t)$ has a power spectral density $N_0/2$ for all frequencies. Find the SNR as a function of the ratio $W/B$. What is the filter bandwidth that yields a maximum SNR?