

ECE 457
Spring 2005
Practice Problems on Chapter 6.1 (Baseband, DSB and SSB)

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 $f_c \leq |f| \leq f_c + W$ 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?