ECE 457
HOMEWORK #9
Due April 1, 2005

- Read Chapter 5.
- Office Hours: W 11:30-1:00, Th 9:30-11:00

1. [20] 5.18 a and c from Ziemer and Tranter. (For part c, we discussed only one way of finding the total power, so you don't have to find it in two different ways.)

2. [15] 5.20 a from Ziemer and Tranter.

3. [20] 5.21 from Ziemer and Tranter.

4. [20] 5.29 a, b, c (Assume that $\theta = 0$.)

5. [25] A noise process has a power spectral density given by

$$S_n(f) = \begin{cases} 10^{-8}(1 - \frac{|f|}{10^8}), & |f| < 10^8 \\ 0, & |f| > 10^8 \end{cases}$$

This noise is passed through an ideal bandpass filter with a bandwidth of 4 MHz centered at 50 MHz.

a) Find the power content of the output process.
b) Write the output process in terms of the in-phase and quadrature components and find the power in each component. Assume $f_c = 50MHz$.
c) Find the power spectral density of the in-phase and quadrature components.
d) Now assume that the filter is not an ideal filter and is described by

$$|H(f)|^2 = \begin{cases} |f| - 49, & 49 < |f| < 51 \\ 0, & otherwise \end{cases}$$

Repeat parts a,b and c.