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.)


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.