

HW 6  
Electronic Communication Systems  
Fall 2008  
California State University, Fullerson

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## Contents

1 Questions

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HW and key are missing.

## 1 Questions

360 CHAPTER 8 ■ RANDOM SIGNALS AND NOISE

- 8.35 Consider a wide-sense stationary process  $X(t)$  having the power spectral density  $S_X(f)$  shown in Fig. 8.26. Find the autocorrelation function  $R_X(\tau)$  of the process  $X(t)$ .

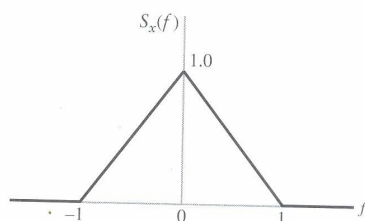


FIGURE 8.26 Problem 8.35.

- 8.36 The power spectral density of a random process  $X(t)$  is shown in Fig. 8.27.
- Determine and sketch the autocorrelation function  $R_X(\tau)$  of  $X(t)$ .
  - What is the dc power contained in  $X(t)$ ?
  - What is the ac power contained in  $X(t)$ ?
  - What sampling rates will give uncorrelated samples of  $X(t)$ ? Are the samples statistically independent?

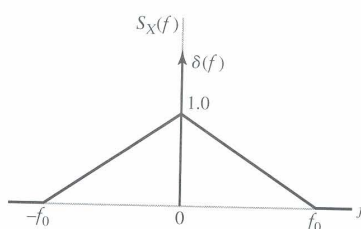


FIGURE 8.27 Problem 8.36.

- 8.37 Consider the two linear filters shown in cascade as in Fig. 8.28. Let  $X(t)$  be a stationary process with autocorrelation function  $R_X(\tau)$ . The random process appearing at the first filter output is  $V(t)$  and that at the second filter output is  $Y(t)$ .
- Find the autocorrelation function of  $V(t)$ .
  - Find the autocorrelation function of  $Y(t)$ .

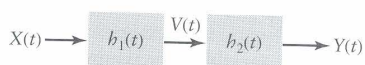


FIGURE 8.28 Problem 8.37.

- 8.38 The power spectral density of a narrowband random process  $X(t)$  is as shown in Fig. 8.29. Find the power spectral densities of the in-phase and quadrature components of  $X(t)$ , assuming  $f_c = 5$  Hz.

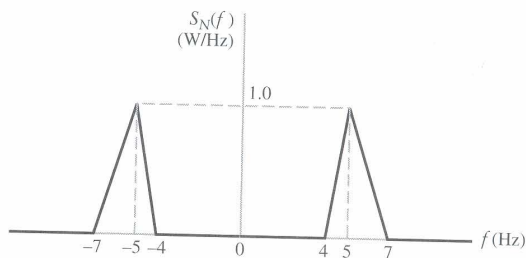


FIGURE 8.29 Problem 8.38.

Figure 1: the Problem statement