

# ECE 520.651 Random Signal Analysis

## Homework # 3

Due 9:00 AM on Friday, September 29, 2006.

Review Chapters 3 and 4 from Stark and Woods before starting the homework.

1. Solve problem **3.11** from Stark and Woods.
2. Solve problem **3.23** from Stark and Woods.
3. Solve problem **4.18** from Stark and Woods.
4. Solve problem **4.36** from Stark and Woods.

5. Compute  $E[X]$  in terms of the free parameter  $\lambda$  when

(a)  $X : \Omega \rightarrow \mathbb{R}$  has a Laplacian density  $f_X(x) = \frac{\lambda}{2}e^{-\lambda|x|}$ ,  $\lambda > 0$ .

(b)  $X : \Omega \rightarrow \mathbb{R}$  has a Cauchy density  $f_X(x) = \frac{\lambda}{\pi} \frac{1}{\lambda^2 + x^2}$ ,  $\lambda > 0$ .

(c)  $X : \Omega \rightarrow \{0, \dots, n\}$  has a binomial density  $f_X(x) = \binom{n}{x} \lambda^x (1 - \lambda)^{n-x}$ ,  $0 \leq \lambda \leq 1$ .

(d)  $X = Y^k$ , and  $Y : \Omega \rightarrow \mathbb{R}$  has an exponential density  $f_Y(y) = \lambda e^{-\lambda y} u(y)$ ,  $\lambda > 0$ .

In each case, check for parameter values  $\lambda$  for which the expectation is *not defined*.

Read pages 51-62 from Prof. Papamarcou's notes after finishing the homework.