

Rutgers, The State University Of New Jersey
Department of Electrical and Computer Engineering
Stochastic Signals and Systems

332:541

Fall 2006

Assigned Problem 1

Due Wednesday, October 11, 2006

As noted on the first day of class, this course will have an occasional short assignment that will be collected and graded. The following problem was given in lecture on Oct. 4. I have pushed the due date back because of the delayed web posting. Here is a formal statement of the assignment:

Let $X_1, X_2, \dots, X_n$ be a collection of iid random variables each with CDF $F_{X_i}(x) = F_X(x)$ and PDF $f_{X_i}(x) = f_X(x)$. Let $Y_1, Y_2, \dots, Y_n$ be defined by

$$\begin{aligned} Y_1 &= X_1, \\ Y_2 &= \max(X_1, X_2), \\ &\vdots \\ Y_n &= \max(X_1, X_2, \dots, X_n) \end{aligned}$$

(a) Find the joint CDF $F_{Y_1, \dots, Y_n}(y_1, \dots, y_n)$.

(b) Find the joint PDF $f_{Y_1, \dots, Y_n}(y_1, \dots, y_n)$.

Comments: The random variables $Y_1, \dots, Y_n$ are dependent since $Y_i = \max(Y_{i-1}, X_i)$. Also, if you use the solution to part (a) in a careless way, you are likely to get the wrong answer for part (b).