EE 464

Homework 6

Due Wednesday April 16, 2003

Work all 8 problems.

Problem 1. Leon-Garcia Ch.4 problem 9.

Problem 2. Leon-Garcia Ch.4 problem 12.

Problem 3. Leon-Garcia Ch.4 problem 13.

Problem 4. Leon-Garcia Ch.4 problem 24.

Problem 5. Let $p_{ik} = P(X = i\ Y = k)$. You are given the following joint probability distribution of the discrete random variable $(X,\ Y)$: $p_{11} = 1/12$, $p_{12} = 0$, $p_{13} = 1/18$, $p_{21} = 1/6$, $p_{22} = 1/9$, $p_{23} = 1/4$, $p_{31} = 0$, $p_{32} = 1/5$, $p_{33} = 2/15$. Find all marginal distributions.

Problem 6. Let X and Y represent the life lengths of components manufactured using different processes. Assume X and Y are independent random variables with pdf's

$$f_X(x) = \begin{cases} e^{-x}, & x > 0 \\ 0, & \text{elsewhere.} \end{cases}$$

and

$$f_Y(y) = \begin{cases} 3e^{-3y}, & y > 0 \\ 0, & \text{elsewhere.} \end{cases}$$

a. Find the pdf of the product of the life lengths: $Z = XY$.

b. Find the pdf of the sum of the life lengths: $W = X + Y$.

Problem 7. Suppose the current I and the resistance R vary randomly in some circuit according to the pdf's

$$f_I(i) = \begin{cases} 2i, & 0 \le i \le 1 \\ 0, & \text{elsewhere.} \end{cases}$$

and

$$f_R(r) = \begin{cases} r^2/9, & 0 \le r \le 3 \\ 0, & \text{elsewhere.} \end{cases}$$

Find the pdf of the random variable V (the voltage in the circuit), where $V = IR$.

Problem 8. The random variables X and Y are independent and each is uniform in the interval $(-2, 2)$. Find the density of the random variable $Z = |X - Y|$.