Assignment 7

1. The amount of kerosene, in thousands of liters, in a tank at the beginning of any day is a random amount Y from which a random amount X is sold during that day. Suppose that the tank is not resupplied during the day so that $x \le y$, and assume that the joint density function of these variables is

$$f(x,y) = \begin{cases} 2, & 0 < x < y, 0 < y < 1 \\ 0, & elsewhere \end{cases}$$

a) Evaluate the marginal distribution of X.

b) Evaluate the marginal distribution of Y.

c) Determine if X and Y are independent.

d) Find P($\frac{1}{4} < x < \frac{1}{2} \mid y = \frac{3}{4}$)

2. Let X denote the number of times a certain numerical control machine will malfunction: 1,2, or 3 times on any given day. Let Y denote the number of times a technician is called on an emergency call. Their joint probability distribution is given as

f(x,y)	x	1	2	3
y	1	0.05	0.05	0.1
	2	0.05	0.1	0.35
	3	0	0.2	0.1

a) Evaluate the marginal distribution of X.

b) Evaluate the marginal distribution of Y.

c) Determine if X and Y are independent.

d) Find $P(y = 3 \mid x = 2)$

e) Find Var(2x+3y).

3. A coin is tossed twice. Let Z denote the number of heads on the first toss and W the total number of heads on the 2 tosses. If the coin is unbalanced and a head has a 40% chance of occurring, find

a) the joint probability distribution of W and Z;

b) the marginal distribution of W;

c) the marginal distribution of Z;

d) the probability that at least 1 head occurs.

4. The joint density function of the random variables X and Y is

$$f(x.y) = \begin{cases} 6x, & 0 < x < 1, 0 < y < 1 - x \\ 0, & elsewhere \end{cases}$$

a) Show that X and Y are not independent.

b) Find $P(x > 0{,}3 \,|\, 0{,}1 < y < 0{,}5)$

c) Find E[2x+y].

Due Date: 29.12.2011