Assignment 3

1) A discrete random variable X has probability function: P(x), where

$$P(x) = \begin{cases} k(1/2)^x & x = 1,2,3 \\ 0 & otherwise \end{cases}$$

a) Find k.
b) Find the cumulative distribution function, F(x).

2) For some constant c, the random variable X has probability density function

$$f(x) = \begin{cases} cx^n & 0 < x < 1 \\ 0 & otherwise \end{cases}$$

a) Find c.
b) Find Cumulative distribution function of x.
c) Find P(X>x).

3) The proportion of people who respond to a certain mail-order solicitation is a continuous random variable X that has the density function

$$f(x) = \begin{cases} \frac{2(x+2)}{5} & 0 < x < 1 \\ 0 & elsewhere \end{cases}$$

a) Show that P(0<X<1) = 1
b) Find the probability that more than 1/4 but fewer than 1/2 of the people contacted will respond to this type of solicitation.
c) Find cumulative distribution function.

4) Two balls are chosen randomly from an urn containing 8 white, 4 black, and 2 orange balls. Suppose that we win $2 for each black ball selected and we lose $1 for each white ball selected. Let X denote our winnings. What are the possible values of X, and what are the probabilities associated with each value?

5) Suppose that a die is rolled twice. What are the possible values that the following random variables can take on
a) the maximum value to appear in the two rolls;
b) the minimum value to appear on the two rolls;
c) the sum of the two rolls;
d) the value of the first roll minus the value of the second roll?
e) If the die is assumed fair, calculate the probabilities associated with the random variables in parts (a) through (d),

6) A salesman has scheduled two appointments to sell encyclopedias. His first appointment will lead to a sale with probability 0.3, and his second will lead independently to a sale with probability 0.6. Any sale made is equally likely to be either for the deluxe model, which costs $1000, or the standard model, which costs $500. Determine the probability mass function of X, the total dollar value of all sales.

7) Suppose that the distribution function of X is given by

$$F(b)=\begin{cases} 0 & b<0 \\ \frac{b}{4} & 0\le b<1 \\ \frac{1}{2}+\frac{b-1}{4} & 1\le b<2 \\ \frac{11}{12} & 2\le b<3 \\ 1 & 3\le b \end{cases}$$

a) Find P(X=i), i=1,2,3

b) Find P($\frac{1}{2}$<X<$\frac{3}{2}$).

Due Date: 03.11.2011