Math 116 Fall 2003—HW #4 Due: Fri. Oct. 2

Reading: Devore §3.1–3.4

Problems from Devore (wording shortened in some cases without affecting meaning):

§3.1, # 4: Let X be the number of nonzero digits in a randomly selected zip code. What are the possible values of X? Give three possible outcomes and their associated X values.

§3.2, # 12: Suppose that a plane has 50 seats but 55 passengers have tickets. Define the random variable Y to be the number of ticketed passengers that show up for the flight. The probability mass function of Y appears below:

y	45	46	47	48	49	50	51	52	53	54	55
$p(y)$	0.05	0.10	0.12	0.14	0.25	0.17	0.06	0.05	0.03	0.02	0.01

(a) What is the prob. that the flight will accommodate all ticketed passengers who show up?

(b) What is the prob. that not all ticketed passengers who show up can be accommodated?

(c) If you are the first person on the standby list, what is the probability that you will be able to take the flight? What is this probability if you are third person on the standby list?

§3.2, # 15: Suppose a computer manufacturer receives computer boards in lots of five. Two boards are selected from each lot for inspection. We can represent possible outcomes of the selection process by pairs, e.g., $(1, 2)$ represents selecting boards 1 and 2.

(a) List the ten different possible outcomes (order within the pair doesn't matter)

(b) Suppose that boards 1 and 2 are the only defective boards in the lot. Let X be the number of defective boards observed among those inspected. Find the probability distribution of X.

(c) Let $F(x)$ denote the cdf of X. First determine $F(0) = P(X \leq 0)$, $F(1)$, and $F(2)$, and then obtain $F(x)$ for all values of x.

§3.2, # 18: Two fair six-sided dice are tossed independently. Let M be the maximum of the two tosses. (a) What is the pmf of M? (b) Determine the cdf of M and graph it.

§3.2, # 25ac: Alvie lives at 0 in the accompanying diagram and has four friends who live at A, B, C, and D. One day, Alvie decides to go visiting, so he tosses a fair coin twice to decide which of the four to visit. Once at a friend's house, he will either return home or else proceed to one of the two adjacent houses (such as 0, A, or C when at B), with each of the three possibilities having probability 1/3. In this way, Alvie continues to visit friends until he returns home.

(a) Let X be the number of times Alvie visits a friend. Derive the pmf of X. Explain.

(c) Suppose that female friends live at A and C and male friends at B and D. Let Z be the number of visits to female friends. What is the pmf of Z? Explain.

§3.3, # 28: The pmf for X = the number of major defects on a randomly selected appliance

is: $P(X = 0) = 0.08$, $P(X = 1) = 0.15$, $P(X = 2) = 0.45$, $P(X = 3) = 0.27$, $P(X = 4) = 0.05$. Compute $E(X)$, $V(X)$ from the definition, the standard deviation of X, and $V(X)$ using the shortcut.

§3.3, # 34: A drugstore orders a magazine for its rack. Let X = demand for the magazine, with pmf:

x	1	2	3	4	5	6
$p(x)$	1/15	2/15	3/15	4/15	3/15	2/15

Suppose the store owner actually pays \$1 for each copy and charges customers \$2. If magazines left at the end have no salvage value, is it better to order three or four copies of the magazine?

§3.3, # 35: Let X be the damage incurred (in dollars) in a certain type of accident during a given year. Possible X values are 0, 1000, 5000, and 10000, with probabilities 0.8, 0.1, 0.08, and 0.02 respectively. A particular company offer a \$500 deductible policy (this means the customer pays the first \$500 and the company the rest). If the company wishes the expected profit to be \$100 per year, what premium amount per year should it charge?

§3.4, # 47: A company that produces fine crystal knows from experience that 10% of its goblets have cosmetic flaws and must be classified as "seconds"

(a) Among six randomly selected goblets, how likely is it that exactly one is a second?

(b) Among six randomly selected goblets, what is the probability that at least two are seconds?

(c) If goblets are examined one by one, what is the probability that at most five must be selected to find four that are not seconds?

§3.4, #62ab: An airport limo can accommodate up to four passengers on any one trip. The company will accept a maximum of six reservations for a trip, and a passenger must have a reservation. From previous records, 20% of those making reservations do not appear for the trip. Answer the following questions, assuming independence when appropriate:

(a) If six reservations are made, what is the probability that at least one individual with a reservation can not be accommodated on the trip?

(b) If six reservations are made, what is the expected number of available places when the limo departs?