Intro to Prob and Stat I
GSIA, Carnegie Mellon University
45-733, Spring 2002 (mini 3)

Midterm, Thursday, Feb 8, 2002

Instructions You may use any books, notes, calculators, and other aids you like. You may not converse, nor may you cooperate.

Please complete all questions.

Each question is worth 20 points.

Please show all relevant work.

Please do use the reverse sides of pages, if necessary, but try to avoid using/attaching additional pages.

1. Of the 36 Superbowls, the NFC has won 20 (56%) and the AFC has won 16 (45%). The mean total number of points scored in a superbowl has been 45. When the AFC has won the superbowl, the score has been under 45 about 63% of the time; whereas, when the NFC has won, the score has been under 45 about 40% of the time.

   (a) How often have the total points in a superbowl been above 45?

   (b) What percentage of superbowls with total points less than 45 have been won by AFC teams?

   (c) Are total points and AFC victory independent? What does your answer mean?

2. Consider the following (population) summary statistics on mouthwash consumption (bottles/year) in the North and South:

	North	South
Mean	0.5	2.0
Median	0.3	1.5
Standard Deviation	0.2	0.4
Interquartile Range	0.6	0.8

(a) Find a range of values within which at least 75% of Northerners fall.

(b) Could it be the case that 75% of Southerners use more mouthwash than does the average (mean) Northerner? Can you tell if it is the case, and, if so, is it?

3. On a typical trip to the Beehive coffee house, the probability of being served by a person with visible non-ear piercing(s) is 0.4. Suppose that whether I am served by such a person is independent from visit to visit.

   (a) If I go to the Beehive every day for a week, what is the probability of being served by a pierced server at least 5 times?

   (b) If I go to the Beehive every day for a (non-leap) year, what is the probability that I am served by such a person at least 180 times?

   (c) Is the independence assumption in this problem reasonable? Why or why not?

4. Suppose that you know that the scores on the midterm for 45-733 follow a normal distribution with a mean of 75 and a standard deviation of 10.

   (a) What is the probability of a randomly selected student scoring more than 90?

   (b) Find the narrowest range of scores within which 80% of scores fall.

   (c) What score is at the 25th percentile?

   (d) Suppose I choose 5 scores at random out of a large population of papers. What is the probability that exactly three of them have scores greater than 80?

5. (Adapted from book, problem 21, page 155) Consider the two random variables with joint distribution tabulated below. X is the number of credit cards owned, and Y is the number of purchases in a week.

(table copied from the book:)

Cards (X)	Purchases (Y)				
	0	1	2	3	4
1	0.08	0.13	0.09	0.06	0.03
2	0.03	0.08	0.08	0.09	0.07
3	0.01	0.03	0.06	0.08	0.08

(a) What is the mean number of cards?

(b) What is the standard deviation of the number of cards?

(c) Are the number of cards and purchases independent?