STAT212 Chapter 12 Homework
Due Monday, March 12, 2012

Q1:

a) Determine the critical value of χ^2 with 1 degree of freedom in each of the following circumstances:
   1) $\alpha = 0.05$
   2) $\alpha = 0.025$
   3) $\alpha = 0.01$

b) An experiment was conducted to study the choices made in mutual fund selection. Undergraduate and MBA students were presented with different S&P 500 index funds that were identical except for fees. Suppose 100 undergraduate students and 100 MBA students were selected. Partial results are shown as follows:

	STUDENT GROUP	
FUND	**Undergraduate**	**MBA**
Highest-cost fund	27	18
Not Highest-cost fund	73	82

Source: *Extracted from J. Choi, D. Laibson, and B. Madrian, "Why Does the Law of One Practice Fail? An Experiment on Mutual Funds," www.som.yale.edu/faculty/jjc83/fees.pdf.*

   1) At the 0.05 level of significance, is there evidence of a difference between undergraduate and MBA students in the proportion who selected the highest-cost fund?
   2) Determine the p-value in (1) and interpret its meaning.
   3) Compare the results of (1) and (2) to those of Problem 10.36 on page 449 of your Berenson textbook

Q2:

a) Consider a contingency table with two rows and five columns.
   1) Find the degrees of freedom.
   2) Find the critical value for $\alpha = 0.05$.
   3) Find the critical value for $\alpha = 0.01$.

b) More shoppers do the majority of their grocery shopping on Saturday than any other day of the week. However, is there a difference in the various age groups in the proportion of people who do the majority of their grocery shopping on Saturday? A study showed the results for the different age groups (extracted from "Major Shopping by Day," *Progressive Grocer Annual Report*, April 30, 2002). The data were reported as percentages, and no sample sizes were given:

	AGE		
MAJOR SHOPPING DAY	**Under 35**	**35-54**	**Over 54**
Saturday	24%	28%	12%
A day other than Saturday	76%	72%	88%

Assume that 200 shoppers for each age category were surveyed.
   1) Is there evidence of a significant difference among the age groups with respect to major grocery shopping day? (Use $\alpha = 0.05$.)
   2) Determine the *p*-value in (1) and interpret its meaning.
   3) If appropriate, use the Marascuilo procedure and $\alpha = 0.05$ to determine which age groups are different. Discuss your results.
   4) Discuss the managerial implications of (1) and (3). That is, how can grocery stores use this information to improve marketing and sales? Be specific.

Q3:
Wang Corporation is interested in determining whether a relationship exists between the commuting time of its employees and the level of stress related problems observed on the job. A study of 123 assembly-line workers reveals the following:

	STRESS LEVEL			
COMMUTING TIME	**High**	**Moderate**	**Low**	**Total**
Under 15 min.	10	6	19	35
15-45 min.	15	9	29	53
Over 45 min.	20	7	8	35
Total	45	22	56	123

a) At the 0.01 level of significance, is there evidence of a significant relationship between commuting time and stress level'?
b) What is your answer to (a) if you use the 0.05 level of significance?

Q4:
The CEO of Raja health care facility would like to assess the effects of recent implementation of Six Sigma management on customer satisfaction. A random sample of 100 patients is selected from a list of patients who were at the facility the past week and also a year ago:

	SATISFIED NOW		
SATISFIED LAST YEAR	**Yes**	**No**	**Total**
Yes	40	17	57
No	23	20	43
Total	63	37	100

a) At the 0.05 level of significance, is there evidence that satisfaction was lower last year, prior to introduction of Six Sigma management?
b) Compute the *p*-value in (a) and interpret its meaning.

Q5:
a) Determine the lower- and upper-tail critical values of χ^2 for each of the following two-tail tests:
   1) $\alpha = 0.01$, $n = 24$
   2) $\alpha = 0.05$, $n = 20$
   3) $\alpha = 0.10$, $n = 16$
b) A manufacturer of doorknobs has a production process that is designed to provide a doorknob with a target diameter of 2.5 inches. In the past, the standard deviation of the diameter has been 0.035 inch. In an effort to reduce the variation in the process, various studies have resulted in a redesigned process. A sample of 25 doorknobs produced under the new process indicates a sample standard deviation of 0.025 inch.
   1) At the 0.05 level of significance, is there evidence that the population standard deviation is less than 0.035 inch in the new process?
   2) What assumption do you need to make in order to perform this test?
   3) Compute the p-value in part (a) and interpret its meaning.