Chi Square Practice Problems

1. A U.S. based internet company offers an on-line proficiency course in basic accounting. Completion of this course satisfies the "Fundamentals of Accounting" requirement in many MBA programs. In the first semester, 315 students enrolled in the course. The marketing manager divided the country into 7 regions of roughly equal populations with the enrollments in each of the regions given below. Management wants to know if there is equal interest in the course across all regions.

Region	Enrollment
1	45
2	60
3	30
4	40
5	50
6	55
7	35

   a) Calculate the expected enrollment for all 7 regions (hint: $p_1 = p_2 = p_3 = p_4 = p_5 = p_6 = p_7$).
   b) At a significance level of 0.05, test H_0: the probabilities are equal for all seven regions.
   c) At a significance level of 0.01, test H_0: the probabilities are equal for all seven regions.
   d) State a one sentence managerial conclusion.

2. In the past, of all the students enrolled in "Basic Business Statistics," 10% earned A's 20% earned B's, 30% earned C's, 20% earned D's and the rest either failed or withdrew from the course. Dr Johnson is a new professor teaching "Basic Business Statistics" for the first time this semester. At the conclusion of the semester, in Dr. Johnson's class of 60 students, there were 10 A's, 20 B's, 20 C's, 5 D's and 5 W's or F's. Assume that Dr. Johnson's class constitutes a random sample. Dr Johnson wants to know if there is sufficient evidence to conclude that the grade distribution of his class is different than the historical grade distribution.
   a) What are the null and alternative hypotheses for this situation?
   b) Calculate the expected values for all categories.
   c) At $\alpha = 0.01$, test to determine if the grade distribution for Dr. Johnson's class is different than the historical grade distribution and make a one-sentence managerial conclusion.

3. On the most recent tax cut proposal, a random sample of democrats and republicans in the Congress cast their votes as follows:

	Favor	Oppose	Abstain
Democrats	85	78	37
Republicans	118	61	25

   a) What are the null and alternative hypotheses for this situation?
   b) What are the expected frequencies for each cell for the chi-square test of independence?
   c) At a significance level of 0.01, what is your conclusion?

4. At a recent meeting of educational researchers, comparisons were made between the type of school college freshmen attend and the numbers who drop out. A random sample of freshmen show the following results:

	4Yr public	4 Yr Private	2 Yr Public	2 Yr Private
Freshmen drop out	10	9	15	9
Freshmen who stay	26	28	18	27

a) What are the null and alternative hypotheses for this situation?
b) Determine the expected frequencies for the chi-square test of independence.
c) At $\alpha = 0.05$, determine if the type of school and the dropout rate are independent.