AP Statistics
Unit 08 – HW #1
Chi Square: Goodness of Fit Test

Name_____
Period_____

1. Acme Toy Company prints baseball cards. The company claims that 30% of the cards are rookies, 60% veterans, and 10% are All-Stars. The cards are sold in packages of 100. Suppose a randomly selected package of cards has 50 rookies, 45 veterans, and 5 All-Stars. Is this consistent with Acme's claim? Use a 0.05 level of significance.

2. A study was performed to determine whether or not the name of a course had an effect on student registrations. A statistics course in a large school district was given 4 different names in a course catalog. Each name corresponded to the exact same statistics course. A random sample of student registrations was recorded and the results are given below:

Course Name	Number of Registrations
Statistical Applications	25
Statistical Reasoning	22
Statistical Analysis	30
The Practice of Statistics	40
TOTAL	117

Do these data suggest the name of the course has an effect on student registrations? Conduct an appropriate statistical test to support your conclusion.

3. Researchers studied the behavior of birds that were searching for seeds and insects in an Oregon forest. In this forest, 54% of the trees were Douglas firs, 40% were ponderosa pines, and 6% were other types of trees. At a randomly selected time during the day, the researchers observed 156 red-breasted nuthatches: 70 were in Douglas firs, 79 in ponderosa pines, and 7 in other types of trees. Do these data provide convincing evidence that nuthatches prefer particular types of trees when they're searching for seeds and insects?

4. Faked numbers in tax returns, invoices, or expense account claims often display patterns that aren't present in legitimate records. Some patterns are obvious and easily avoided by a cleaver crook. Others are subtler. It is a striking fact that the first digits of numbers in legitimate records often follow a model knows and Benford's law. Call the first digit of a randomly chosen record X or short. Benford's law gives this probability model for X (note that the first digit cannot be 0).

1st Digit	1	2	3	4	5	6	7	8	9
Probability	0.301	0.176	0.125	0.097	0.079	0.067	0.058	0.051	0.046

A forensic accountant who is familiar with Benford's law inspects a random sample of 250 invoices from a company that is accused of committing fraud. The table below displays the sample data.

1st Digit	1	2	3	4	5	6	7	8	9
Probability	61	50	43	34	25	16	7	8	6

a. Are these data inconsistent with Benford's law? Carry out an appropriate test where $\alpha = 0.05$ level to support your answer.

b. Describe a Type 1 error and a Type II error in this setting, and give a possible consequence of each. Which do you think is more serious?