Practice Problems for Statistical Inference

1. A large public opinion polling agency plans to conduct a national survey to determine the proportion of employed adults who fear losing their job within the next year. They found that 35 out of 100 randomly selected employed adults were fear losing their job within the next year.
   a) Find the 95% confidence interval estimate for the proportion of the population of employed adults who fear losing their job within the next year.

   b) How many workers must be polled in order to construct a 95% confidence interval estimate with a margin of error 1% ?

2. A drug antibiotic manufacturer randomly sampled 12 different locations in the fermentation vat to determine average potency for the batch of antibiotic being prepared. Readings were as follows:

   8.9 9.0 9.1 8.9 9.1 9.0 9.5 9.0 8.9 9.3 9.1 8.8

   a) Find the mean, the standard deviation (you can use the special function keys in the calculator) for this data set.

   b) Assume that the sample is from a normal population. Use the data set above to estimate the mean potency for the batch, based on a 95% confidence interval. Interpret the interval.

   c) How large a sample is needed if one wishes to have a 95% confidence interval with a margin of error within 0.01?

3. A group of researchers claimed that the average vegetable consumed by people holding a college nursing degree 5 lbs per week. A random sample of 8 individuals who have college nursing degree were surveyed and the data on their vegetable consumption per week is the following:

   4.3 5.4. 2.6 6.6 3.3 3.2 2.2 2.5

   The researchers wish to test whether the average vegetable consumption is different from 5 lbs per week.
   a) What is the null hypothesis of this test?

b) What is the alternative hypothesis of this test?

c) What are the sample mean and the sample standard deviation of this data?

d) If one wishes to perform a t-test for this data, is normality assumption necessary?

e) What is the value of the t-test statistic?

f) At 5% level of significance, is there a significant evidence to support that the average vegetable consumption is different from 5 lbs per week? Write a proper conclusion.

g) Is the p-value of this test greater than 0.05?

4. In a survey, a group of randomly selected physicians was asked to report their gender and whether they prefer using treatment A for a certain disease. The result is organized in the following table.

	Use Treatment A	Do not use Treatment A
Male	23	18
Female	10	25

Researchers wish to test to see if there is any correlation between the gender variable and the treatment used by the physicians.

a) What is the null hypothesis of this test?

b) What is the alternative hypothesis of this test?

c) If one wishes to do a chi-square test, what are the conditions that need to be verified before using the test?

h) At 5% level of significance, is there a significant evidence to support that there is significant correlation between gender and treatment preference variables? Write a proper conclusion.

d) Is the p-value of this test greater than .01?