1. [15 pts.] In a study of the accuracy of fast food drive-through orders, McDryHeave's had 38 orders that were not accurate among 362 orders observed. Construct 95% and 98% confidence intervals for the proportion of orders that are not accurate.

2. [15 pts.] One of Mendel's famous genetic experiments yielded 580 peas, with 428 of them green and 152 yellow. Find a 99% confidence interval estimate of the *percentage* of green peas. Based on his theory of genetics, Mendel expected that 75% of the offspring peas would be green. Given that the percentage of offspring green peas is not 75%, do the results contradict his theory? Why or why not?

3. [10 pts. each] A sociologist plans to conduct a survey to estimate the percentage of adults who believe in astrology (not to be confused with astronomy). How many adults must be surveyed if we want a confidence level of 99% and a margin of error of four percentage points?

   (a) Assume that nothing is known about the percentage to be estimated.

   (b) Use the information from a previous survey in which 26% of respondents said that they believed in astrology.

4. [15 pts.] A clinical trial was done to test the effectiveness of the drug bigpharmazone for treating insomnia. Before treatment with bigpharmazone, 19 subjects had a mean wake time of 102.8 min. After treatment the 19 subjects had a mean wake time of 98.9 minutes and a standard deviation of 42.3 min. Assume the 19 sample values appear to be from a normally distributed population and construct a 98% confidence interval estimate of the mean wake time for a population with bigpharmazone treatments. (Neglect possible confounding factors such as subjects lying awake worrying how they're going to pay Big Pharma's bill for a prescription of bigpharmazone.) What does the result suggest about the mean wake time of 102.8 minutes before the treatment? Does bigpharmazone appear to be effective?

5. [15 pts.] Listed below are amounts of arsenic (as μg/serving) found by the FDA in samples of brown rice from California. Find a 90% confidence interval for the mean. The FDA also measured amounts of arsenic in samples of brown rice from Arkansas. Can the confidence interval be used to describe arsenic levels in Arkansas?

$$5.4 \quad 5.6 \quad 8.4 \quad 7.3 \quad 4.5 \quad 7.8 \quad 1.5 \quad 6.9 \quad 9.2 \quad 8.7$$

6. [10 pts.] For the clinical trial described in #4, construct a 98% confidence interval estimate of the standard deviation σ of the wake times for a population with bigpharmazone treatments.

7. [4 pts. each] In a study of 1228 randomly selected medical malpractice lawsuits, it was found that 706 of them were dropped or dismissed. Use a 0.01 significance level to test the claim that most malpractice lawsuits are dropped or dismissed.

   (a) State H_0 and H_a, identifying the claim.

   (b) Find the critical value(s).

   (c) Identify the rejection region.

   (d) Find the standardized test statistic.

   (e) Can the claim be rejected?

8. [4 pts. each] In a test of the effectiveness of garlic for lowering cholesterol, 49 subjects were treated with raw garlic. Cholesterol levels were measured before and after treatment. The changes (before minus after) in their levels of LDL cholesterol (in mg/dL) have a mean of 0.4 and standard deviation of 21.0. Use a 0.05 significance level to test the claim that with garlic treatment, the mean change in LDL cholesterol is greater than 0.

   (a) State H_0 and H_a, identifying the claim.

   (b) Find the critical value(s).

   (c) Identify the rejection region.

   (d) Find the standardized test statistic.

   (e) Can the claim be rejected?