Stat C1000 Exam 3 Practice.
Show all calculations when appropriate. This is not homework; do not turn in.

1. A government agency wishes to assess the rate of unemployment in a particular county. A poll is conducted, and 500 randomly selected persons are interviewed and 41 are found to be unemployed. Compute a 95% confidence interval for the proportion of unemployed in the county. Interpret your result.

2. For a simple random sample of 40 particular brand vehicles, the mean gas mileage was 20 miles per gallon with a (sample) standard deviation of 1.5 miles per gallon.
a. Construct a 99% confidence interval for the mean gas mileage of similar vehicles.
b. Is it possible that the mean gas mileage is greater than 23 miles per gallon? Explain.

3. The data represent a random sample of the number of home fires started by candles for the past several years. (Data are from the National Fire Protection Association.) Find the 99% confidence interval for the mean number of home fires started by candles each year.

5460 5900 6090 6310 7160 8440 9930

4. A dairy refuses to accept raw milk having more than 5000 bacteria per milliliter (mL). The bacteria count varies from shipment to shipment. Assume that the count of bacteria per milliliter is normally distributed with a population standard deviation of 16. The dairy wants to test that the mean bacteria count is less than 5000 per mL for the next shipment using a 1% significance level. A simple random sample of 64 one-mL samples from the next shipment resulted in a mean bacteria count of 4995. Use the information to perform a hypothesis test with a 0.01 significance level.

5. A genetic experiment involving peas yielded one sample of offspring consisting of 416 green peas and 173 yellow peas. Use a 0.01 significance level to test the claim that under the same circumstances, 26% of offspring peas will be yellow. Identify the null hypothesis, alternative hypothesis, test statistic, P-value, conclusion about the null hypothesis, and final conclusion that addresses the original claim.

6. Listed below are the lead concentrations (in $\mu g/g$) measured in different Ayurveda medicines. Ayurveda is a traditional medical system commonly used in India. The lead concentrations listed here are from medicines manufactured in the United States. Assume that a simple random sample has been selected. Test the claim that the mean lead concentration for all such medicines is less than 14.0 $\mu g/g$.

2.96 6.45 6.03 5.48 20.49 7.45 12.03 20.47 11.5 17.54

7. A Levi Strauss & Co. clothing manufacturing plant in Albuquerque, New Mexico, has a quality control department. Every week data are collected from its suppliers on the waste (called runoff) relative to what can be achieved by computer layouts of patterns on cloth. A negative value for waste would indicate that the plant employees beat the computer in controlling waste for that week. The waste data for one of the supplier plants for 19 weeks are provided to assess if, on average, this plant performs worse than the computer at controlling waste. The waste data from the 19-week sample resulted in a sample mean of 4.83 square yards and a sample standard deviation of 4.40 square yards. Test the claim that the plant performs worse than the computer at controlling waste with a 5% significance level.

Key:

1. $0.058 < p < 0.106$. Various interpretation.
2. a. $19.4 < \mu < 20.6$; b. Yes, but unlikely.
3. $4785.2 < \mu < 9297.6$
4. $z = -2.5$, rejects, conclude…
5. $z = 1.87$, $p = 0.062$, fails to reject, conclude…
6. $t = -1.45$, fails to reject, conclude…
7. $t = 4.78$, reject, conclude…