MTH 2300 – Chapter 7 & 8 Problems

These problems come from previous editions of our textbook. Think of this problem set as a “Practice Exam”. These problems will not be collected or graded. Solution sheets will be available on Review Day.

On your exam, CONFIDENCE INTERVALS will be graded on the following three criteria:
- Show the correct z or t statistic for the desired confidence level
- Show the correct calculation of the confidence interval
- Write a conclusion (a complete English sentence) about the population mean in terms of the problem

1. We want to estimate the average amount of time that voters spend in the polling booth. To do this, we randomly sampled 50 voters and found a sample mean of 58.82 seconds. From previous studies, we know the population standard deviation is 27.657 seconds. Construct a 94% confidence interval estimate of the population mean voting time.

2. A study was conducted to estimate hospital costs for accident victims who wore seat belts. Twenty randomly selected cases had a distribution that appears to be bell-shaped with a sample mean of $9004 and a sample standard deviation of $5629. Construct the 99% confidence interval for the mean of all such costs.

3. In a study of the Clarke method of gender selection, 40 couples tried to have a baby girl. Among the 40 babies, 62.5% were girls. Construct a 98% confidence interval estimate for the proportion of girl babies produced by couples who use the Clarke method of gender selection.

4. Suppose we want to estimate the mean weight of plastic discarded by households in one week. How many households must we randomly select if we want to be 99% confident that the sample mean is within 0.25 pounds of the true population mean? A pilot study done at the University of Arizona suggests that the population standard deviation is \( \sigma = 1.065 \) pounds.

Concerned about campus safety, the police in Newark, New Jersey want to estimate the percentage of high school students who carry a gun, a knife, or other such weapon. How many randomly selected students must be surveyed in order to be 95% confident that the sample proportion has a margin of error of at most three percentage points?

5. Assume that 7% of all high school students in Newark carry a weapon.

6. Assume we have no information at all about the proportion of high school students in Newark who carry a weapon.

OVER – There are more problems on the back.
On your exam, **HYPOTHESIS TESTS** will be graded on the following five criteria:

- Write the correct null and alternative hypotheses
- Write the rejection rule with the critical value of z or t
- Calculate the correct value of the test statistic z or t
- Write a conclusion. What do we believe in this problem as a result of the hypothesis test?
- Give the p-value

7. For the new Cadillac to be certified as "fuel efficient", General Motors must prove, at the $\alpha = .05$ significance level, that it averages more than 21 miles per gallon. Engineers measured the gas mileage of a random sample of 75 vehicles. The sample average was 21.5 miles per gallon. From previous work, they know the population standard deviation is 3.3 miles per gallon. Perform the appropriate hypothesis test to determine if the new Cadillac is fuel efficient.

8. A sample of beverage cans labeled 12 ounces was randomly selected and the actual contents was accurately measured. The results, in ounces, are given below. Perform a hypothesis test at the $\alpha = .10$ significance level to determine if the consumer is being cheated.

   11.8  11.9  12.2  11.5  11.7  11.7