Practice For Test 4 (Chapter 8)
MATH 1530

Instructions. Here are some questions I have asked on previous tests.

1. A salesman claims that more than one-fourth of all customers buy his brand vacuum cleaner. If we wanted to test this claim, what would be our null and alternative hypotheses?

2. To test a claim that the mean body temperature of adult humans is NOT 98.6 degrees, a random sample of 106 adults is taken. Based upon this sample, a \( p \) value of 0.045 is computed. If a significance level of \( \alpha = 0.05 \) is used, what would be the conclusion about the null hypothesis and what would be the wording of the final conclusion?

3. A recent sample of 23 student vehicles found that the mean age of the vehicles was 3.5 years with a standard deviation of 1.9 years. If you wanted to use this data to test the claim, at the \( \alpha = 0.1 \) significance level, that the mean age of student vehicles is less than 4 years, what would be your critical value? What would be the decision test in this case? Assume that the ages of student vehicles are normally distributed.

4. A cereal company claims that the standard deviation of the cereal in its boxes is less than 0.5 ounce. You wish to test this claim at the 0.05 level of significance. The mean weight for a random sample of 25 cereal boxes is 13.8 ounces with a standard deviation of 0.3 ounces. What criterion would be used for rejecting the null hypothesis?
   a. Reject \( H_0 \) if test statistic < 36.415.
   b. Reject \( H_0 \) if test statistic < 13.848.
   c. Reject \( H_0 \) if test statistic < -1.645.
   d. Reject \( H_0 \) if test statistic < -1.711.

5. In A Sports Illustrated for Kids survey of 603 children, 43% preferred McDonald’s for fast food. An advertising executive claims that McDonald’s is preferred by half of all children. Test this claim at the 0.05 significance level.

6. What is the \( p \) value for your test statistic found in #5?

7. A recent survey of 35 statistics students found that they spent a mean of 6.3 hours studying per week with a standard deviation of 2.1 hours. Use this sample data to test the claim that statistics students spend less than 7 hours studying per week. Use a significance level of 0.01.

8. Listed below are the total electric energy consumption amounts (in kWh) for a three bedroom house during seven randomly selected years

   8,943  9,863  10,899  9,807  9,472  9,672  10,753

   Find the mean and standard deviation for this sample.
   The utility company claims that the mean annual consumption amount is more than 9,000 kWh. Assuming the total electric energy consumption amounts are normally distributed, test the utility company’s claim at the 0.05 significance level.

9. A manufacturing manager claims that the piston cylinders produced at her facility have diameters with a standard deviation of less than 0.01 millimeter. Twenty-two randomly selected cylinders from the facility yield a standard deviation of 0.0089 millimeters. Test the manager’s claim at the 0.05 significance level assuming the distribution of cylinder diameters is normal.