



3. The machine that packages Tortilla chips is calibrated so that the net weight of each bag is 13.05 ounces. As part of the routine quality control, the manager took a random sample of 25 bags from the production line and measured their weights. The mean weight was 13.047 ounces with a standard deviation of 0.013. At the significance level of .01, conduct a test to determine whether the true mean weight is less than the target value. Assume that the net weights of the bags are approximately normally distributed. (15 pts.)

$H_0$ : \_\_\_\_\_ vs.  $H_a$ : \_\_\_\_\_

Compute the test statistic and approximate the  $p$ -value.

Should the null hypothesis be rejected? Circle one.            Yes            No

4. Are you a “half full” person (optimist) or a “half empty” person (pessimist)? For a course project, a college student presented to a random sample of 150 students with a pint glass filled with 8 ounces of water. He then handed each student a slip of paper that said, “The glass is half \_\_\_\_\_. Fill in the blank.” Of the 150 students, 89 filled in the blank with “full” and 61 with “empty.” Conduct a test to determine whether the majority of the students are optimists. Use  $\alpha = .10$ . (15 pts.)

$H_0$ : \_\_\_\_\_ vs.  $H_a$ : \_\_\_\_\_

Compute the test statistic and the  $p$ -value.

Should the null hypothesis be rejected? Circle one.            Yes            No

5. A botanist wanted to estimate the average height of a particular species of a flower. She took a random sample of 45 flowers and measured their heights. The mean was 37.7 centimeters with a standard deviation of 2.9.
- (a) Form a 95% confidence interval for the true mean height of this species of flower. (12 pts.)
- (b) In order for the estimate of the mean height to be off of the true value by no more than 0.6 centimeter with 95% certainty, how large a sample is needed? (10 pts.)
6. A high school teacher conducted a test of hypotheses to determine whether the average test score was higher than 78. She stated, “The results of the test were significant at the significance level of .05.”
- (a) What is meant by “results of the test were significant” in this context? Briefly explain. (6 pts.)
- (b) If the teacher were to conduct the same test at the significance level of .10, what conclusion would she draw? That is, should she reject or retain the null hypothesis? (6 pts.)