

Name: _____

Directions: This exam contains four problems worth a total of 100 points. For each computational problem, you must first write the formula to be used and present all your subsequent work in order to receive full or partial credit. Circle your final answers.

1. George periodically calculates the gas mileage of his car when he fills up his gas tank. He obtained a sample mean of 28.5 miles/gallon based on 40 random observations.
 - (a) Assuming that the standard deviation of the gas mileage is $\sigma = 1.9$, construct a 90% confidence interval for the true mean gas mileage of his car. (10 pts.)

 - (b) George plans to take a new sample to estimate the mean gas mileage of his car. This time, he wants his estimate to be within 0.40 mile/gallon of the true value with 90% certainty. How many observations must he make? (10 pts.)

2. The manufacturer's suggested retail price (MSRP) of certain computer software is \$399. Actual retail prices of this software were obtained from 30 stores selected at random, yielding a mean price of \$387 with a standard deviation of \$7.
 - (a) Conduct a test to determine whether the mean retail price of this software at all stores is lower than the MSRP using a significance level of .01. (14 pts.)

H_0 : _____ vs. H_a : _____

Compute the test statistic and define the rejection rule.

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

- (b) The test in (a) *should* reject the the null hypothesis. If the same test were conducted at a significance level of .05, would it reject or retain the null hypothesis? No computation is necessary to answer this question. (6 pts.)

3. It is estimated that the weight of a one-pound carrot bag has mean $\mu = 1.12$ pounds and standard deviation $\sigma = 0.09$. You will randomly select $n = 35$ one-pound bags and compute the sample mean weight.
- (a) What is the expected value (or the mean) of the sample mean weight? (8 pts.)
- (b) What is the standard deviation of the sample mean weight? (8 pts.)
- (c) Find the probability that the mean weight of the sample will exceed 1.10 pounds. (10 pts.)
4. In a random sample of 183 college students, 33 of them indicated that they “carefully read” their textbooks and 74 indicated that they just “skim through” their textbooks.
- (a) Conduct a test of hypotheses for the conjecture that 20% of the students “carefully read” their textbooks. Use $\alpha = .05$. (14 pts.)

H_0 : _____ vs. H_a : _____

Compute the test statistic and define the rejection rule.

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

- (b) Regardless of what you actually computed, suppose that the test statistic in (a) was $z^* = -0.70$. Compute the p -value of the test. (10 pts.)
- (c) Estimate the true proportion the students who “skim through” their textbooks using a 95% confidence interval. (10 pts.)