

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. The unit price (in dollars per pound) of a Porterhouse steak cut is best characterized as having a normal distribution with mean $\mu = 8.45$ and standard deviation $\sigma = 0.63$.
 - (a) What is the probability that a randomly selected Porterhouse steak cut will have a unit price higher than \$9.25? (10 pts.)

 - (b) If you check the prices of 25 Porterhouse steak cuts at various stores, what is the probability that the mean unit price will be higher than \$8.75? (10 pts.)

2. In a random sample of 150 people, 101 indicated that they felt sleepy after eating a turkey meal.
 - (a) Using a significance level of .05, conduct a test of hypotheses to determine whether turkey has a sleep-inducing effect on less than 75% of the people. (15 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) For the test conducted in (a), regardless of what you actually computed, suppose that the test statistic was $z^* = -2.15$. Compute the p -value of the test. (10 pts.)

3. It is of interest to estimate the mean height of all trees in a small section of a forest. Assume that the standard deviation of the tree height is known to be 2.8 feet.

(a) In order for the estimate of the mean height to be within 0.55 foot of the true value with 95% certainty, how many trees must be observed? (10 pts.)

(b) Suppose that randomly chosen 75 trees showed a mean height of 67.4 feet. Estimate the true mean using a 95% confidence interval. (10 pts.)

4. It is conjectured that the mean length of a particular species of a snake is 1.28 meters. To test the truth of this conjecture, 20 snakes of this species were taken at random and their lengths measured. The mean was 1.36 meters with a standard deviation of 0.87.

(a) With $\alpha = .05$, conduct a test to determine whether the true mean length differs from 1.28 meters. (15 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 two-sided test in (a) *should not* reject the null hypothesis. If a 95% confidence interval is constructed for the true mean length, should the interval contain $\mu_0 = 1.28$? Briefly explain why or why not. (10 pts.)

(c) Referring to (b) above, construct a 95% confidence interval for the true mean length. (10 pts.)