

Pledge:

3/27/2009  
Dr. Lunsford

MATH 171  
Quiz 4

Name: \_\_\_\_\_  
40 Points Possible

Please show all work on this quiz. Please be sure to show all calculator input.

**Problem I.** The average height of 18-year-old American women is 64.2 inches. You conjecture that this year's female graduates from your school district are shorter, on average, than the national average. You measure a SRS of 18 female graduates from your high school district and find that  $\bar{x} = 63.1$  inches. State the null and alternative hypotheses you would use to test your conjecture. Clearly indicate the meaning of the parameter in the hypotheses in context. Also indicate which hypothesis corresponds to the conjecture. (5 points)

**Problem II.** A machine manufactures precision parts. Suppose a quality control inspector randomly selects 9 parts manufactured by this machine and computes a 95% confidence interval for the mean diameter of all parts manufactured by the machine to be from 40.167 centimeters (cm) to 40.193 cm. Please answer the following questions: (15 points total)

(a) What was the value of the mean diameter of the nine parts selected by the inspector? (2 points)

(b) What is the margin of error for the confidence interval? (2 points)

(c) The machine is working properly if it produces precision parts that have a diameter of 40.2 cm, on average. Based on the confidence interval given above, do you think the machine is working properly or not? Briefly explain. (3 points)

(c) Please write "true" or "false," according to which is correct, in the blank provided next to each statement. (2 points each, 4 total)

\_\_\_\_\_ There is a 95% chance that the true mean of all parts manufactured by this machine is in the interval (40.167 cm, 40.193 cm).

\_\_\_\_\_ There is a 100% chance that the mean of the sample of 9 parts is in the interval (40.167 cm, 40.193 cm).

(d) To decrease the margin of error of the confidence interval should the inspector *increase* or *decrease* or *not change* each of the following (while keeping all other values the same)? (2 points each, 4 total)

Confidence level:      increase      decrease      not change      (please circle one)

Sample size:            increase      decrease      not change      (please circle one)

**Problem III.** Suppose we want to compute an 87.4% confidence interval for a population mean. What is the critical value (i.e. value of  $z^*$ ) we would need to use? (3 points)

**Problem IV.** A labor specialist at a large manufacturing plant wants to compare the blood pressure of the male employees at the plant to the general population of men of a similar age. She obtains the medical records of 22 male employees at the plant between 35 and 44 years of age. The National Center for Health Statistics reports that the systolic blood pressure for all males age 35 to 44 years of age has a mean of 128 and a standard deviation of 15. The specialist tests the hypotheses  $H_0 : \mu = 128$  against  $H_{alt} : \mu \neq 128$  where  $\mu$  is the mean blood pressure of male employees age 35 to 44 at the plant. Please answer the following questions: (17 points total)

(a) What assumptions must be satisfied in order to conduct a z-test for a population mean for these hypotheses? Please make sure to state the assumptions in the context of this problem. (6 points)

(b) The specialist finds the mean blood pressure of the 22 male employees to be 126.07. Assume that  $\sigma = 15$  and conduct a z-test for a population mean. Please show all calculator input and clearly indicate the value of the test statistic and p-value below. (2 points each, 4 total)

Test statistic:

p-value:

(c) Draw a picture that illustrates the p-value you found in part (b). (3 points)

(d) What is the labor specialist's conclusion in the context of this problem? (4 points)