Pledge:

4/23/2006 MATH 171 Name:_____
Dr. Lunsford Test 3 100 Points Possible

Multiple Choice, True/False, and Short Answer. (20 points total)

1. A simple random sample of 20 third-grade children from a certain school district is selected, and each is given a test to measure his/her reading ability. We are interested in calculating a 95% confidence interval for the population mean score. In the sample, the mean score is 64 points, and the standard deviation is 12 points. What is the margin of error associated with the confidence interval? (4 points)

(a) 2.68 points (b) 4.64 points (c) 5.62 points (d) 11.232 points

2. The heights (in inches) of males in the U.S. are believed to be normally distributed. The average height of a random sample of 25 American adult males is found to be 69.72 inches with a standard deviation of 4.15. What is the standard error of the sample mean? (4 points)

(a) 4.15 (b) 0.166 (d) 2.04 (e) 0.83

3. A 95% confidence interval for the difference between two population means, i.e. $\mu_2 - \mu_1$, is (–4.96, 24.96). Use this information to determine whether each of the following statements is true or false. Please write "true" or "false" according to which is correct in the blank provided by each statement. (2 points each, 6 points total)

_____Based on the confidence interval, we can conclude, at the 5% significance level, that there is no difference between the two population means, μ_2 and μ_1.
_____The margin of error for the difference between the two sample means would be smaller if we were to take larger samples.
_____If a 99% confidence interval were calculated instead of the 95% interval, it would include more values for the difference between the two population means.

4. The *P*-value for a hypothesis test is 0.0284. At which of the following significance levels is the data statistically significant? There may be more than one correct answer, circle all that are correct. (4 points)

(a) $\alpha = 0.01$ (b) $\alpha = 0.025$ (c) $\alpha = 0.05$ (d) $\alpha = 0.10$

Problem I. The hypotheses H_0: $\mu = 350$ versus H_a: $\mu < 350$ are examined using a sample of size $n = 20$. The one-sample t statistic for the test has the value $t = -1.68$. Find the *P*-value for the test and draw a graph that clearly shows the *P*-value and the test statistic. (9 points)

Problem II. After once again losing a football game to the college's arch rival, the alumni association conducted a survey to see if the majority of alumni were in favor of firing the coach. Let p represent the proportion of all living alumni who favor firing the coach. To see if the majority of alumni are in favor of firing the coach the alumni association used the hypotheses H_0: $p = 0.50$ versus H_a: $p > 0.50$. The P-value for the test is 0.0026. What is the conclusion of the alumni association (in the context of this problem)? (9 points)

Problem III. The city council of town A claims that the price of apartments is lower in their town than in town B. You have been asked to investigate this claim. You take a simple random sample of 12 apartments in town A and calculate the average price of these apartments. You repeat this for 15 apartments in town B. Let μ_1 represent the true average price of apartments in town A and μ_2 the average price in town B. Please answer the following: (9 points total)

(a) What would be the hypotheses you would use to test the claim? (5 points)

(b) What statistical test would you use to test the hypotheses in part (a)? What assumptions will you need to make in order to use the test? (4 points)

Problem IV. Bags of a certain brand of tortilla chips claim to have a net weight of 14 oz. Net weights actually vary slightly from bag to bag. Assume net weights are normally distributed. As a representative of a consumer advocate group you wish to see if there is any evidence that the mean net weight is less than advertised and thus you test the hypotheses H_0: $\mu = 14$, H_a: $\mu < 14$. To do this, you select 16 bags of tortilla chips of this brand at random and determine the net weight of each. The bags have a mean net weight of 13.88 oz. with a standard deviation of 0.24 oz. (13 points total)

(a) What statistical test will you use to conduct the test? Why? (3 points)

(b) Find the value of the test statistic and the P-value of the test. Clearly indicate all calculator input. (5 points)

(c) What is your conclusion in the context of this problem? (5 points)

Problem V. What is the smallest sample size would you need to estimate the proportion of Americans that approve of the job George Bush is doing as President of the United States with a margin of error of no more than 1% with 97% confidence? Please show all work for this computation. (9 points)

Problem VI. We would like to determine if students tend to improve their SAT Mathematics (SAT-M) score the second time they take the test. A random sample of four students who took the test twice received the following scores.

Student	1	2	3	4
First score	450	520	720	600
Second score	440	600	720	630

Assume that the change in SAT-M score (second score – first score) for the population of all students taking the test twice is normally distributed. Let μ be the mean change in SAT-M score. Please answer the following. (14 points total)

(a) What hypotheses will you use to determine if students tend to improve their SAT Mathematics (SAT-M) score the second time they take the test? (5 points)

(b) Conduct the appropriate test for your hypotheses in part (a). Clearly indicate which test you are using, all calculator input, the value of the test statistic, and the *P*-value of the test. (5 points)

(c) What is your conclusion in the context of this problem? (4 points)

Problem VII. The Pew Research Center for the People and the Press survey conducted by Princeton Survey Research Associates International on April 7-16, 2006, asked the following question: "Looking ahead to the next presidential election, would you like to see a president who offers policies and programs similar to those of the Bush Administration, or would you like to see a president who offers different policies and programs?" Of the 1500 randomly selected American adults sampled, 70% said they would like to see different policies. Please answer the following. (17 points total)

(a) Find a 90% confidence interval for the true proportion of Americans who would like to see different policies. Please indicate all calculator input. (6 points)

(b) Write a complete English sentence describing the meaning of the confidence interval you computed in part (a). (5 points)

(b) Please fill in the blanks in the following sentence: _____ percent of Americans would like to see the next president offer policies and programs different from those of the Bush Administration (based on a sample of _____adults with a margin of error of _____ percent). (6 points)