

Pledge:

11/8/2007
Dr. Lunsford

MATH 171
Quiz 5

Name: _____
30 Points Possible

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

Problem I. The composition of the earth's atmosphere may have changed over time. To try to discover the nature of the atmosphere long ago, we can examine the gas in bubbles inside ancient amber. Amber is tree resin that has hardened and been trapped in rocks. The gas in bubbles within amber should be a sample of the atmosphere at the time the amber was formed. Measurement on specimens of amber from the late Cretaceous era (75 to 95 million years ago) give these percents of nitrogen:

63.4 65.0 64.4 63.3 54.8 64.5 60.8 49.1 51.0

Please answer the following questions. (19 points total)

(a) What assumptions must you make in order to use a one-sample t-procedure (i.e. either a t-test or a t-interval)? Please be sure to state these assumptions in the context of this problem. (4 points)

(b) What is the value of the standard error of the sample mean? (3 points)

(c) Compute a 90% confidence interval for the mean percent of nitrogen in ancient air. Please be sure to show all calculator input. (3 points)

(d) Write a complete English sentence giving the meaning of the confidence interval you found in part (c). (3 points)

Problem I., continued.

(e) Do the data above give good reason to think that the percent of nitrogen in the air during the Cretaceous era was quite different than the present 78.1%? Conduct the appropriate hypothesis test to answer this question. Clearly state your hypotheses (being sure to describe the parameter in the context of this problem), give the value of the test statistic and p-value, and state your answer in the context of this problem. (6 points)

Problem II. A labor specialist thinks the mean travel time to work for all workers in North Carolina is 20 minutes. A random sample of 15 workers finds that their mean travel time is $\bar{x} = 22.5$ minutes. The labor specialist believes the true mean will not be significantly different from 20 minutes. What are the null and alternative hypotheses for testing this belief? Clearly state your hypotheses, indicate which hypothesis is the belief, and give the meaning of the parameter in the context of this problem. (4 points)

Problem II. Dr. Lunsford performed a one-sample z-test with the following hypotheses: $H_0 : \mu = 45$ versus $H_a : \mu < 45$ where μ is the mean age (in years) of female mathematics teachers in the state of Virginia. Her data yielded $z = -1.23$ for the z test statistic. Please answer the following: (7 points total)

(a) Find the p-value of the test and draw a picture that shows the test statistic and p-value. (4 points)

(b) What is Dr. Lunsford's conclusion of this test (in the context of the stated problem)? Conduct the test at the $\alpha = 0.05$ level. (3 points)