

Unit 4 Test

(62 points possible)

Instructions: All work must be shown. Credit will not be provided for answers only. Be sure to use only formulas from your textbook. No credit will be provided for the use of outside sources.

Reminder: This must be mailed along with your Unit 4 Homework Assignment.

Question 1 (5 points)

A random sample of 40 students has a mean annual earnings of \$3120. Assume the population standard deviation is \$677. Construct the confidence interval for the population mean if $c = .95$

Question 2 (6 points)

A nurse at a local hospital is interested in estimating the birth weight of infants. How large a sample must she select if she desires to be 99% confident that the true mean is within 4 ounces of the sample mean? The standard deviation of the birth weights is known to be 9 ounces.

Question 3 (3 points)

A random sample of 15 statistics textbooks has a mean price of \$105 with a sample standard deviation of \$30.25. Determine whether a normal distribution or a t-distribution should be used or whether neither of these can be used to construct a confidence interval. Assume the distribution of statistics textbook prices is not normally distributed. You must include your rationale for your decision.

- a. Cannot use normal distribution or t-distribution.
- b. Use normal distribution.
- c. Use the t-distribution.

Question 4 (5 points)

Construct a 90% confidence interval for the population mean, μ . Assume the population has a normal distribution. A sample of 15 randomly selected students has a grade point average of 2.86 with a sample standard deviation of 0.78.

Question 5 (3 points)

When 370 college students were surveyed, 155 said they own their car. Find a point estimate for p , the population proportion of students who own their cars.

Question 6 (5 points)

A survey of 280 homeless persons showed that 63 were veterans. Construct a 90% confidence interval for the proportion of homeless persons who are veterans.

Question 7 (1 point)

A pollster wishes to estimate the proportion of United States voters who favor capital punishment. How large a sample is needed in order to be 99% confident that the sample proportion will not differ from the true proportion by more than 4%?

Question 8 (2 points)

The mean score for all NBA games during a particular season was less than 93 points per game. Write the null and alternative hypotheses.

Question 9 (2 points)

A researcher claims that 65% of voters favor gun control. Determine whether the hypothesis test for this claim is left-tailed, right-tailed, or two-tailed. Explain your reasoning.

Question 10 (2 points)

The mean IQ of statistics teachers is greater than 140. Identify the type I and type II errors for the hypothesis test of this claim.

Question 11 (2 points)

The P-value for a hypothesis test is $P = 0.033$. Do you reject or fail to reject H_0 when the level of significance is $\alpha = 0.01$? Explain your reasoning.

- a. fail to reject H_0
- b. reject H_0
- c. not sufficient information to decide

Question 12 (2 points)

Find the critical value and rejection region for the type of z-test with level of significance α . Left-tailed test, $\alpha = 0.05$

Question 13 (8 points)

A local politician, running for reelection, claims that the mean prison time for car thieves is less than the required 6 years. A sample of 80 convicted car thieves was randomly selected, and the mean length of prison time was found to be 5 years and 6 months, with a population standard deviation of 1 year and 3 months. At $\alpha = 0.05$, test the politician's claim.

Credit will be provided for the following:

- 1) null and alternative hypotheses
- 2) critical value
- 3) test statistic
- 4) decision
- 5) conclusion

Question 14 (8 points)

The Metropolitan Bus Company claims that the mean waiting time for a bus during rush hour is less than 8 minutes. A random sample of 20 waiting times has a mean of 6.6 minutes with a sample standard deviation of 2.1 minutes. At $\alpha = 0.01$, test the bus company's claim. Assume the distribution is normally distributed.

Credit will be provided for the following:

- 1) null and alternative hypotheses
- 2) critical value
- 3) test statistic
- 4) decision
- 5) conclusion

Question 15 (8 points)

An airline claims that the no-show rate for passengers is less than 5%. In a sample of 420 randomly selected reservations, 19 were no-shows. At $\alpha = 0.01$, test the airline's claim.

Credit will be provided for the following:

- 1) null and alternative hypotheses
- 2) critical value
- 3) test statistic
- 4) decision
- 5) conclusion