

MATH 3307

Homework 9 (Lessons 26 - 28)

Instructions: Answer all questions through the EMCF tab of casa under the assignment named “Homework 9” before the deadline.

There is no “Submit” button. Your answers will be automatically submitted once the deadline arrives.

Assignments will be graded out of 20 points.

For Questions 1 - 4, indicate Choice A: True, or Choice B: False

1. As the length of a confidence interval increases, the degree of confidence in its actually containing the population parameter being estimated also increases.
2. A 90% confidence interval for a population mean implies that there is a 0.90 probability that the true population mean will be contained in the confidence interval.
3. The point estimate of a population parameter is always at the center of the confidence interval for that parameter.
4. The larger the level of confidence, the shorter the confidence interval.
5. If we change a 90% confidence interval estimate to a 95% confidence interval estimate, the width of the confidence interval will: A. Increase B. Decrease C. Not Change

Base your answers for Questions 6 - 9 on the following: In a survey conducted on a SRS of 200 American adults, 72% of them said they believe in aliens. Give a 95% confidence interval for the percent of American adults who believe in aliens.

6. Have the assumptions been met?
 - A. Yes. Values of 72 and 28.
 - B. Yes. Values of 144 and 56.
 - C. Yes. Values of 14400 and 5600.
 - D. No. Values of 0.72 and 0.28.
 - E. No. Values of 14.4 and 5.6.
7. Calculate the Confidence Interval:
 - A. [0.6678, 0.7722]
 - B. [0.7180, 0.7219]
 - C. [0.7156, 0.7244]
 - D. [0.6578, 0.7822]
 - E. [0.5658, 0.8742]

8. Give an interpretation of this interval.

- A. 95% of the population has a proportion in the specified interval.
- B. 95% of the sample has a proportion in the specified interval.
- C. We are 95% certain that the sample proportion is in the specified interval
- D. We are 95% certain that the population proportion is in the specified interval.
- E. 95% of respondents reported their beliefs to be within the specified interval.

9. After a second run of the study, it was determined that the sample proportion is actually slightly less than the original 72% originally reported. What impact will this have on the width of the confidence interval?

- A. The new interval will be wider.
- B. The new interval will be narrower.
- C. The new interval will be the same width.

For Questions 10 - 11, consider the following: You wish to design a study to estimate the proportion of students on your campus that agree with the following statement: "The student government is an effective organization for expressing the needs of students to the administration." You will use a 95% confidence interval and you would like a margin of error of this interval to be 0.05 or less. Find the minimum sample size required.

10. Since there is no initial \hat{p} value presented in the question, how do we proceed?

- A. $\hat{p} = 0.95$
- B. $\hat{p} = 0.5$
- C. $\hat{p} = 0.05$
- D. $\hat{p} = 0.10$
- E. Without an initial sample proportion provided, we cannot proceed.

11. Minimum sample size:

- A. $n = 384$
- B. $n = 96$
- C. $n = 10$
- D. $n = 97$
- E. $n = 385$

For Questions 12 - 14, refer to the following: According to a survey, 97% of women in a study acknowledged specific food cravings while only 67% of men did. Assume that 600 of the respondents were women and 400 were men. Find and interpret the 90% confidence interval for the difference in population proportions.

12. Are the assumptions met?

- A. Assumptions are met for both samples
- B. Assumptions are met for the "Men" sample, but not the "Women."
- C. Assumptions are met for the "Women" sample, but not the "Men."
- D. Assumptions are not met for either sample.

13. Calculate the appropriate confidence interval.

- A. [0.3134, 0.3363]
- B. [0.2470, 0.3530]
- C. [0.2597, 0.3403]
- D. [0.2686, 0.3314]
- E. [0.2614, 0.3386]

14. Give an interpretation of these results.

- A. We are 90% certain that the difference in percentages of men and women experiencing food cravings fall within in the specified interval.
- B. We are 90% certain that the percentages of men and women experiencing food cravings both fall within in the specified interval.
- C. 90% of men and women feel that the difference report experiencing food cravings a percentage of the time, specified within the given interval.
- D. The specified interval represents 90% of the data for men and women having food cravings.

15. You have measured the systolic blood pressure of a random sample of 25 employees of a company located near you. A 95% confidence interval for the mean systolic blood pressure for the employees of this company is (122, 138). Which of the following statements gives a valid interpretation of the confidence level?

- A. 95% of the sample of employees have a systolic blood pressure between 122 and 138.
- B. 95% of the population of employees have a systolic blood pressure between 122 and 138.
- C. If the procedure were repeated many times, 95% of the resulting confidence intervals would contain the population mean systolic blood pressure.
- D. The probability that the population mean blood pressure is between 122 and 138 is .95.

16. If the 98% confidence limits for the population mean are 73 and 80, which of the following could be the 95% confidence limits?

- A. 73 and 81
- B. 72 and 79
- C. 72 and 81
- D. 74 and 79

17. A 95% confidence interval for the mean reading achievement score for a population of third grade students is (44.2, 54.2). Suppose you compute a 99% confidence interval using the same information. Which of the following statements is correct?

- A. The intervals have the same width.
- B. The 99% interval is longer.
- C. The 99% interval is shorter.
- D. None of the above.

18. Which of the following confidence intervals will be the smallest?

- A. 80%
- B. 95%
- C. 90%
- D. 98%

19. Which of the following best describes the shape of the sampling distribution of the sample proportion?

- A. When standardized, it is exactly the standard normal distribution.
- B. When standardized, it is the t distribution.
- C. It is approximately normal as long as $n \geq 30$.
- D. It is approximately normal as long as $np \geq 10$ and $n(1-p) \geq 10$.

20. A study was conducted to determine the percent of children that want to grow up work in the same career as a parent. In a sample of 200 children, it was calculated that 43% wanted to eventually work in the same career as a parent. Construct the 95% confidence interval for the population proportion.

Proposed Solution:

$$\text{phat} = 0.43/200 = 0.00215$$

$$\text{phat} - \text{qnorm}(1.95/2) * \text{sqrt}(\text{phat} * (1 - \text{phat}) / 200) = -0.00426926$$

$$\text{phat} + \text{qnorm}(1.95/2) * \text{sqrt}(\text{phat} * (1 - \text{phat}) / 200) = 0.00856926$$

$$[-0.0043, 0.0086]$$

What is wrong with the proposed solution?

- A. phat was already provided, so dividing that value by the sample size is incorrect
- B. For a 95% confidence level, the z^* is calculated by $\text{qnorm}(0.95)$.
- C. You cannot use “phat” in an R Studio command. The decimal must be written
- D. You cannot have negative values as one of the limits on your interval. This should be made positive.
- E. The proposed solution is correct.