

Unit 8: Statistical Inferences

ADVANCED · SET 2

Name: _____ Date: _____

Show all work. Use $z = 1.96$ for 95%, $z = 1.645$ for 90% confidence, and the empirical rule (68-95-99.7) where indicated; round probabilities to 4 decimal places and other answers to 2 decimals unless told otherwise.

1. A variable is normally distributed with mean 82 and standard deviation 6. Find the z-score of the value 95. Round to 2 decimals.

Answer: _____

2. Scores are normally distributed with mean 500 and standard deviation 100. By the empirical rule (68-95-99.7), what percent of scores fall between 300 and 700?

Answer: _____

3. In a random sample of $n = 150$, the sample proportion is $\hat{p} = 0.6$. Find the margin of error for a 95% confidence interval ($z = 1.96$). Round to 3 decimals.

Answer: _____

4. A population has standard deviation $\sigma = 40$. For a sample of size $n = 64$, find the margin of error for a 95% confidence interval for the mean ($z = 1.96$). Round to 1 decimal.

Answer: _____

5. How large a sample is needed to estimate a population proportion with margin of error 0.05 at 95% confidence ($z = 1.96$), using the conservative value $p = 0.5$? Give the smallest whole number.

Answer: _____

6. In an experiment, the treatment group had a mean response of 45.2 and the control group had a mean response of 38.6. Find the observed treatment effect (treatment mean minus control mean).

Answer: _____

7. IQ scores are normally distributed with mean 100 and standard deviation 15. Find $P(X < 130)$, given that the area to the left of $z = 2.00$ is 0.9772. Round to 4 decimals.

Answer: _____

8. A variable is normally distributed with mean 60 and standard deviation 8. Find the 90th percentile value, using $z = 1.28$. Round to 2 decimals.

Answer: _____

9. A variable is normally distributed with mean 200 and standard deviation 25. Find $P(180 < X < 240)$. Use area left of $z = 1.60$ is 0.9452 and area left of $z = -0.80$ is 0.2119. Round to 4 decimals.

Answer: _____

10. In a poll, 320 of 500 voters support a measure, so $\hat{p} = 0.64$. Find the margin of error for a 90% confidence interval ($z = 1.645$). Round to 3 decimals.

Answer: _____

11. A study observed a difference in group means of 5.4. In 200 re-randomizations of the data under the null hypothesis, 6 produced a difference of 5.4 or greater. Estimate the P-value as a decimal.

Answer: _____

12. A machine makes bolts whose lengths are normally distributed with mean 10.00 mm and standard deviation 0.02 mm. A bolt is defective if its length is outside 9.96 mm to 10.04 mm. Using the empirical rule, what percent of bolts are defective?

Answer: _____