

Exam 4 Practice Test - PART I

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Use the given degree of confidence and sample data to construct a confidence interval for the population proportion p .

- 1) Of 118 randomly selected adults, 34 were found to have high blood pressure. Construct a 95% confidence interval for the true percentage of all adults that have high blood pressure.

1) (0.208, 0.372)

$$n = 118 \quad \hat{p} = \frac{34}{118} = 0.29 \quad 95\% \rightarrow z_{0.95} = 1.96$$

$$\hat{q} = 0.71$$

$$E = 1.96 \sqrt{\frac{0.29 \times 0.71}{118}} = 0.082$$

$$0.29 \pm 0.082 = (0.208, 0.372)$$

- 2) Of 150 adults selected randomly from one town, 30 of them smoke. Construct a 99% confidence interval for the true percentage of all adults in the town that smoke.

2) (0.116, 0.284)

$$n = 150 \quad \hat{p} = \frac{30}{150} = 0.2 \quad 99\% \rightarrow z_{0.99} = 2.58$$

$$\hat{q} = 0.8$$

$$E = 2.58 \sqrt{\frac{0.2 \times 0.8}{150}} = 0.084$$

$$0.2 \pm 0.084$$

- 3) Of 260 employees selected randomly from one company, 18.46% of them commute by carpooling. Construct a 90% confidence interval for the true percentage of all employees of the company who carpool.

3) (0.1446, 0.2246)

$$n = 260$$

$$\hat{p} = 0.1846$$

$$\hat{q} = 0.8154$$

$$90\% \rightarrow z_{0.9} = 1.645$$

$$E = 1.645 \sqrt{\frac{0.1846 \times 0.8154}{260}} = 0.04$$

$$0.1846 \pm 0.04$$

Use the confidence level and sample data to find a confidence interval for estimating the population μ . Round your answer to the same number of decimal places as the sample mean.

- 8) A laboratory tested 82 chicken eggs and found that the mean amount of cholesterol was 228 milligrams with $\sigma = 19.0$ milligrams. Construct a 95% confidence interval for the true mean cholesterol content, μ , of all such eggs.

8) (223.888, 232.112)

$$n=82 \quad \bar{x}=228 \quad \sigma=19 \quad 95\% \rightarrow z_{0.95}=1.96$$

$$\sigma \text{ known} \rightarrow E = z_c \frac{\sigma}{\sqrt{n}} = 1.96 \frac{19}{\sqrt{82}} = 4.112$$

$$\bar{x} \pm E = 228 \pm 4.112$$

- 9) 37 packages are randomly selected from packages received by a parcel service. The sample has a mean weight of 10.3 pounds and a standard deviation of 2.4 pounds. What is the 95% confidence interval for the true mean weight, μ , of all packages received by the parcel service?

9) (9.527, 11.073)

$$n=37 \quad \bar{x}=10.3 \quad \sigma=2.4 \quad 95\% \rightarrow z_{0.95}=1.96$$

$$\sigma \text{ known} \rightarrow E = z_c \frac{\sigma}{\sqrt{n}} = 1.96 \frac{2.4}{\sqrt{37}} = 0.773$$

$$\bar{x} \pm E = 10.3 \pm 0.773$$

- 10) A group of 59 randomly selected students have a mean score of 29.5 with a standard deviation of 5.2 on a placement test. What is the 90% confidence interval for the mean score, μ , of all students taking the test?

10) (28.386, 30.614)

$$n=59 \quad \bar{x}=29.5 \quad \sigma=5.2 \quad 90\% \rightarrow z_{0.90}=1.645$$

$$\sigma \text{ known} \rightarrow E = z_c \frac{\sigma}{\sqrt{n}} = 1.645 \frac{5.2}{\sqrt{59}} = 1.114$$

$$\bar{x} \pm E = 29.5 \pm 1.114$$

Use the given degree of confidence and sample data to construct a confidence interval for the population mean μ . Assume that the population has a normal distribution.

- 11) A laboratory tested twelve chicken eggs and found that the mean amount of cholesterol was 185 milligrams with $s = 17.6$ milligrams. Construct a 95% confidence interval for the true mean cholesterol content of all such eggs.

11) $(173.817, 196.183)$

$$n=12 \quad \bar{x}=185 \quad s=17.6 \quad 95\% \rightarrow t_{0.95}=2.201$$

$$\sigma \text{ unknown} \rightarrow E = t_c \frac{s}{\sqrt{n}} = (2.201) \frac{17.6}{\sqrt{12}} \quad d.f. = 11$$

$$= 11.183$$

$$\bar{x} \pm E = 185 \pm 11.183$$

- 12) The football coach randomly selected ten players and timed how long each player took to perform a certain drill. The times (in minutes) were:

12) $(7.949, 11.011)$

7.0 10.8 9.5 8.0 11.5

7.5 6.4 11.3 10.2 12.6

Determine a 95% confidence interval for the mean time for all players.

$$n=10 \quad \bar{x}=9.48 \quad s=2.14 \quad 95\% \rightarrow t_{0.95}=2.262$$

$$d.f. = 9$$

$$\sigma \text{ unknown} \rightarrow E = t_c \frac{s}{\sqrt{n}} = (2.262) \frac{2.14}{\sqrt{10}} = 1.531$$

$$\bar{x} \pm E = 9.48 \pm 1.531$$

- 13) Thirty randomly selected students took the calculus final. If the sample mean was 95 and the standard deviation was 6.6, construct a 99% confidence interval for the mean score of all students.

13) $(91.679, 98.321)$

$$n=30 \quad \bar{x}=95 \quad s=6.6 \quad 99\% \rightarrow t_{0.99}=2.756$$

$$d.f. = 29$$

$$\sigma \text{ unknown} \rightarrow E = t_c \frac{s}{\sqrt{n}} = (2.756) \frac{6.6}{\sqrt{30}} = 3.321$$

$$\bar{x} = 95 \pm 3.321$$

Use the given information to find the minimum sample size required to estimate an unknown population mean μ .

14) Margin of error: \$126, confidence level: 99%, $\sigma = \$512$

14) 110

$$E = 126 \quad 99\% \rightarrow z_{0.99} = 2.58 \quad \sigma = 512$$

$$n = \left(\frac{z_c \sigma}{E} \right)^2 = \left(\frac{2.58 \times 512}{126} \right)^2 = 109.91$$

15) How many business students must be randomly selected to estimate the mean monthly earnings of business students at one college? We want 95% confidence that the sample mean is within \$135 of the population mean, and the population standard deviation is known to be \$538.

15) 62

$$95\% \rightarrow z_{0.95} = 1.96 \quad E = 135 \quad \sigma = 538$$

$$n = \left(\frac{z_c \sigma}{E} \right)^2 = \left(\frac{1.96 \times 538}{135} \right)^2 = 61.01$$

16) How many commuters must be randomly selected to estimate the mean driving time of Chicago commuters? We want 90% confidence that the sample mean is within 4 minutes of the population mean, and the population standard deviation is known to be 12 minutes.

16) 25

$$90\% \rightarrow z_{0.90} = 1.645 \quad E = 4 \quad \sigma = 12$$

$$n = \left(\frac{z_c \sigma}{E} \right)^2 = \left(\frac{1.645 \times 12}{4} \right)^2 = 24.35$$