LESSON MAKER PRO

Claims in Range

Build confidence intervals and check claims.

HIGH SCHOOL · S.DA.5.4

S.DA.5.4 "Construct a confidence interval for the mean of a normally distributed population (with a known standard deviation) and for a population proportion. Use confidence intervals to evaluate claims."

NAME _____ DATE _____

THE BIG IDEA

For an approximate 95% confidence interval, use the sample estimate ± 2 × standard error. For a mean, standard error = known population standard deviation / square root of sample size. For a proportion, standard error = square root of (p(1 - p)/n), where p is the sample proportion and n is the sample size. A claim inside the interval is plausible, not proven.

WORKED EXAMPLE

Use the sample data to find an approximate 95% confidence interval for the mean of a normally distributed population.

SAMPLE DATA

Measure	Value
Sample mean	72
Known population standard deviation	9
Sample size	81

1. Standard error = 9 / square root of 81 = 1.
2. Margin of error = 2 × 1 = 2.
3. Interval = 72 ± 2 = [70, 74].

Answer: [70, 74]

PRACTICE 4 problems

1 A sample of 16 has mean 50. The population is normally distributed with known standard deviation 8. Find the approximate 95% confidence interval for the mean.

ANSWER _____

2 A sample of 100 has mean 120. The population is normally distributed with known standard deviation 10. Find the approximate 95% confidence interval for the mean.

ANSWER _____

3 In a random sample of 100 students, 50 use the library weekly. Find the approximate 95% confidence interval for the population proportion.

ANSWER _____

4 In a random sample of 100 students, 80 own earbuds. Find the approximate 95% confidence interval for the population proportion.

ANSWER _____

APPLY IT Show your work

1 A game claims its players average 35 minutes of play daily. For 36 randomly chosen players, the mean is 30 minutes. Assume daily times are normally distributed with known population standard deviation 6 minutes. Find the approximate 95% interval. Is the claim plausible?

WORK SPACE

ANSWER _____

2 A student council claims 53% of students favor a later start time. In a random sample of 400 students, 200 favor it. Find the approximate 95% interval. Is the claim plausible?

WORK SPACE

ANSWER _____

CHALLENGE One step up

In a random poll of 400 students, 80 say they bike to school. Find the approximate 95% interval for the population proportion. Which claim is plausible, 22% or 25%? Explain.

WORK SPACE AND ANSWER

Claims in Range

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	A sample of 16 has mean 50. The population is normally distributed with known standard deviation 8. Find the approximate 95% confidence interval for the mean.	**[46, 54]**
2	A sample of 100 has mean 120. The population is normally distributed with known standard deviation 10. Find the approximate 95% confidence interval for the mean.	**[118, 122]**
3	In a random sample of 100 students, 50 use the library weekly. Find the approximate 95% confidence interval for the population proportion.	**[0.40, 0.60]**
4	In a random sample of 100 students, 80 own earbuds. Find the approximate 95% confidence interval for the population proportion.	**[0.72, 0.88]**

PART 2 · APPLY IT

1. **[28, 32] minutes; no, 35 minutes is outside the interval.** The standard error is 6 / square root of 36 = 1, so the margin is 2 minutes. The interval does not contain 35.
2. **[0.45, 0.55]; yes, 0.53 is inside the interval.** The sample proportion is 0.50, and its standard error is square root of (0.50 × 0.50 / 400) = 0.025. The margin is 0.05.

CHALLENGE

[0.16, 0.24]. The 22% claim is plausible because it is inside the interval. The 25% claim is outside the interval.

Accept equivalent fraction or percent endpoints. Intervals use 2 as the multiplier, so they are approximate 95% confidence intervals.