Confidence intervals for a population mean

6 questions | 13 marks

Equivalent correct methods earn the corresponding marks.

1. A normal population has known SD 12. A sample of 36 has mean 80. Find a 95% interval. [2 marks]

Standard error $=2$; margin $=3.92$.

Answer: $(76.08, 83.92)$.

2. For mean 18.5, known SD 4 and $n=64$, use 1.645 for a 90% interval. [2 marks]

Standard error $=0.5$; margin $=0.8225$.

Answer: $(17.6775, 19.3225)$.

3. An interval is $(12.2, 15.8)$. Recover its centre and margin. [2 marks]

Take the midpoint and half-width.

Answer: Centre 14; margin 1.8.

4. A known-spread normal interval uses $n = 6$ from a strongly skewed population. What is the concern? [2 marks]

Known spread alone does not justify normality with a small skewed sample.

Answer: The mean distribution need not be approximately normal.

5. A mean estimate is 250 with standard error 2.5. Use 2.576 for a 99% interval. [2 marks]

Margin $= 2.576 \times 2.5 = 6.44$.

Answer: $(243.56, 256.44)$.

6. A large independent random sample has $n = 144$, mean 48.2 and sample standard deviation 12. Population spread is unknown. Use an approximate 95% normal interval for the mean. [3 marks]

Estimate standard error as $\frac{12}{\sqrt{144}} = 1$.

Use the approximate margin $1.96 \times 1 = 1.96$.

The interval uses sample spread and a large-sample normal approximation, not an exact known-spread model.

Answer: Approximately $(46.24, 50.16)$.