Sampling variation and distributions of sample means

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. A population has SD 15. Find the standard error for $n = 25$ independent observations. [2 marks]

$\frac{15}{\sqrt{25}} = 3.$

Answer: 3.

2. A population has mean 42. What is the mean of the sampling distribution of a random sample mean? [2 marks]

Under independent identically distributed sampling, the sample mean is unbiased for the population mean.

Answer: 42.

3. Is the mean of 4 normal observations exactly normal or only approximately normal? [2 marks]

Independent normal linear combinations are normal.

Answer: Exactly normal, assuming independence.

4. Why may a sample of 30 be insufficient for a very skewed population? [2 marks]

Convergence depends on shape and tails, not only a fixed n threshold.

Answer: The approximation can still be poor.

5. A sample mean has SE 2 at $n = 100$. What is its SE at $n = 25$ with the same population SD? [2 marks]

Reducing n by a factor of four doubles SE.

Answer: 4.

6. A website surveys only volunteers. Would increasing its sample from 500 to 5000 remove self-selection bias? [2 marks]

The same selection mechanism can remain biased even with a much larger sample.

Answer: No.