edX

Unbiased Estimation
Video

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UCSDSE212017-V019300

▶

- Hello and welcome back.

Last time we discussed estimating the variance.

Today we're going to talk about unbiased estimation

of the variance.

And we're going to resolve the mystery of the missing man.

So what we're going to do is evaluate the bias

of the estimated raw

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11.4_Unbiased_Variance_Estimation

POLL
Compared to the distribution variance, the expectation of the biased "raw" sample variance is

○ **always larger**

○ **always smaller**

○ **always equal**

○ **could be any of the above**

[Submit]

1

1/1 point (graded)
As the sample size n grows, the effect of the Bessel correction

○ becomes larger,

◉ becomes smaller, ✔

○ stays the same.

Explanation
Sample variance $S_n^2 = \frac{n-1}{n}\sigma^2$. When n grows, $\frac{n-1}{n} \to 1$ and the effect becomes smaller.

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ⓘ   Answers are displayed within the problem

2

2.0/2.0 points (graded)
According to the U.S. Department of Agriculture, ten to twenty earthworms per cubic foot is a sign of healthy soil. The soil of a garden is checked by digging 8 holes, each of one-cubic-foot, and counting the earthworms, and the following counts are found: 5, 25, 15, 10, 7, 12, 16, 20. Use the unbiased estimators discussed in the video to estimate

- the true mean,

13.75   ✔ **Answer:** 13.75

13.75

Explanation

If X_i, $1 \le i \le 8$ denotes the samples, the unbiased estimator for the true mean is given by $\overline{\overline{X}} = \sum_{i=1}^{8} X_i / n = 110/8 = 13.75$.

- the true variance.

44.5   ✔ **Answer:** 44.5

44.5

Explanation

The unbiased estimator for the true variance is given by

$$S = \sum_{i=1}^{8} \left(X_i - \overline{\overline{X}} \right)^2 / (n-1) = 311.5/7 = 44.5.$$

| Submit | You have used 1 of 4 attempts |

ℹ   Answers are displayed within the problem

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