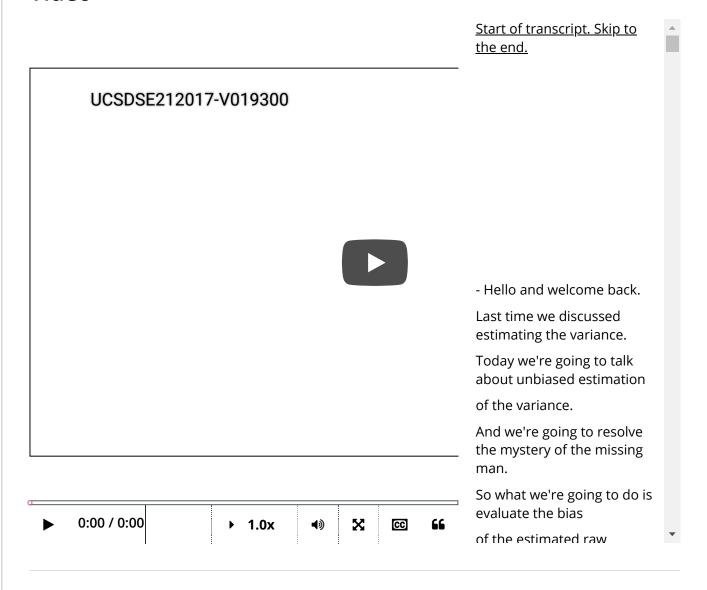


<u>Course</u> > <u>Topic 1</u>... > <u>11.4 U</u>... > Unbias...

# Unbiased Estimation Video



#### 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

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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  $S_n^2=rac{n-1}{n}\sigma^2.$  When n grows,  $rac{n-1}{n} o 1$  and the effect becomes smaller.

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You have used 1 of 1 attempt

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

• the true variance.

44.5

**✓ Answer:** 44.5

44.5

#### **Explanation**

The unbiased estimator for the true variance is given by

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

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You have used 1 of 4 attempts

**1** Answers are displayed within the problem

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