Variance of 1D datasets

LATEST SUBMISSION GRADE

100%

1. What is the variance of the following dataset? 1 / 1 point

$\mathcal{D} = \{1, 2, 3, 2\}$

Please use decimal numbers in your answer.

.67

Correct

OK, you divided by the number of data points -1, which will give you an unbiased estimate.

2. What is the standard deviation of the dataset $\mathcal{D} = \{1, 2, 3, 2\}$ which we already used in the previous question? You should provide a decimal number as your answer. 1 / 1 point

.82

Correct

Indeed: You just needed to take the square-root of the variance.

3. What would be the new variance if we added 1 to each element in the dataset $\mathcal{D} = \{1, 2, 3, 2\}$ from Question 1? Please use decimal numbers in your answer. 1 / 1 point

.67

Correct

Yes: adding a constant to the dataset does not change its variance.

4. What would be the new variance if we multiplied each sample in a dataset $\mathcal{D}$ by 2. 1 / 1 point

- (●) The variance of the new dataset will be four times the variance of $\mathcal{D}$.
- ( ) The variance of the new dataset will be two times the variance of $\mathcal{D}$.
- ( ) The variance of the new dataset will not change.

Correct

Well done!

5. Assuming we have mean $\bar{x}_{n-1}$ and variance σ^2_{n-1} for some dataset $\mathcal{D}_{n-1}$ with $n-1$ samples. What would be the variance σ^2_n if we add a new element x_* to the dataset (assuming you have computed the new sample mean $\bar{x}_n$)? 1 / 1 point

- ( ) $\sigma^2_n = \frac{n-2}{n-1}\sigma^2_{n-1} + \frac{1}{n}(x_* - \bar{x}_{n-1})(x_* - \bar{x}_n)$
- (●) $\sigma^2_n = \frac{n-1}{n}\sigma^2_{n-1} + \frac{1}{n}(x_* - \bar{x}_{n-1})(x_* - \bar{x}_n)$
- ( ) $\sigma^2_n = \frac{n-1}{n}\sigma^2_{n-1} + \frac{1}{n-1}(x_* - \bar{x}_{n-1})(x_* - \bar{x}_n)$
- ( ) $\sigma^2_n = \frac{n-1}{n}\sigma^2_{n-1} + \frac{1}{n}(x_* - \bar{x}_{n-1})^2$

Correct

Great job!