Answers: Expected value, variance, standard deviation

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Summary

Answers to questions relating to the guide on expected value, variance, and standard deviation.

*These are the answers to* [*Questions: PMFs, PDFs, and CDFs.*](../questions/qs-expectedvariance.qmd)

**Please attempt the questions before reading these answers!**

## Q1

For each of the following valid random variables with associated probability mass function, work out the expected value and variance.

#### 1.1.

Here, and .

#### 1.2.

Here, and .

#### 1.3.

This is a Bernoulli trial, with probability of success . From Example 2 of [Guide: Expected value, variance, standard deviation](../studyguides/expectedvariance.qmd), you can say that . The variance can be worked out to be

#### 1.4.

Here, and .

## Q2

For each of the following valid random variables with associated probability density function, work out the expected value andvariance.

#### 2.1.

This is the continuous uniform distribution with and . From Example 2 of [Guide: Expected value, variance, standard deviation](../studyguides/expectedvariance.qmd), you can say that and

#### 2.2.

Here, and .

## Q3

You know that the expected value and variance of rolling one fair die are and .

Because the roll of each die is an independent event, the random variable of rolling seven dice is the same as

which is seven lots of .

You can use the properties of expected values and variance to get

and

## Q4

When doing this question, you need to find the two integrals

You will need to use integration by parts; you should always differentiate the power of to reduce the size of the power. Use the given result to evaluate the integral when ; the antiderivative should always be in this case.

## Version history and licensing

v1.0: initial version created 08/25 by tdhc.

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