Answers: PMFs, PDFs, and CDFs

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Summary

Answers to questions relating to the guide on PMFs, PDFs, and CDFs.

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

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

## Q1

#### 1.1.

The given PMF is valid because:

**Non-negativity**: All

**Honesty**: The sum of all probabilities equals 1:

.

#### 1.2.

The given PMF is valid because:

**Non-negativity**: All

**Honesty**: The sum of all probabilities equals 1:

#### 1.3.

The completed PMF table for the biased coin toss is:

|  | Heads | Tails |
| --- | --- | --- |
|  | 0.3 | 0.7 |

This is a valid PMF because:

**Non-negativity**: Both

**Honesty**: The sum of both probabilities equal 1:

#### 1.4. {-}

This is not a valid PMF since it fails the honesty condition:

**Honesty**: The sum of the given probabilities does not equal 1:

#### 1.5.

1. The PMF for the given scenario is:

|  | Red | Blue | Green |
| --- | --- | --- | --- |
|  | 0.5 | 0.3 | 0.2 |

This is a valid PMF because:

**Non-negativity**: All

**Honesty**: The sum of all three probabilities equals to 1:

#### 1.6.

1. For the given PMF to be valid, you must have .
2. For , then .

## Q2

#### 2.1.

This is a valid PDF because:

**Non-negativity**: for all values of .

**Honesty**:

#### 2.2.

This is a valid PDF because:

**Non-negativity**: for all values of

**Honesty**:

#### 2.3.

This is a valid PDF because:

**Non-negativity**: for all values of

**Honesty**:

#### 2.4.

This is not a valid PDF since it does not meet the honesty condition:

**Honesty**:

Calculating the individual integrals:

And adding them together:

#### 2.5.

1. For the given PDF to be valid, you must have .

#### 2.6.

This is a valid PDF because:

**Non-negativity**: for all values of

**Honesty**:

Calculating the individual integrals:

and adding them together gives .

## Q3

#### 3.1.

#### 3.2.

1. The CDF for values , , and :
2. (since the CDF for any is .)

#### 3.3.

1. The CDF at points , , and :
2. .

#### 3.4.

This is not a valid CDF because the CDF should be non-decreasing as increases.

## Version history and licensing

v1.0: initial version created 12/24 by Sophie Chowgule as part of a University of St Andrews VIP project.

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