Questions: Conditional Probability

Sophie Chowgule

Summary

A selection of questions to test your understanding of conditional probability, the multiplication rule, and independence.

*Before attempting these questions it is highly recommended that you read [Guide: Conditional Probability].*

## Q1

Answer the following using the definition of conditional probability.

#### 1.1.

In a deck of cards, one card is drawn at random. Let be the event that the card is a heart, and the event that the card is red. What is the probability that the card is a heart, given that it is red?

#### 1.2.

In a class:

* of students are left-handed
* of left-handed students play the piano

What is the probability that a randomly chosen student plays the piano, given that they are left-handed?

#### 1.3.

In a class:

* of students take French,
* of students take both French and Spanish.

Let be the event that a student takes Spanish, and the event that the student takes French. What is the probability that a student takes Spanish, given that they take French?

#### 1.4.

The table below shows survey results about whether students bring a packed lunch and whether they are in Year 12:

|  | Year 12 | Not Year 12 | Total |
| --- | --- | --- | --- |
| **Packed lunch** | 0.25 | 0.15 | 0.40 |
| **No packed lunch** | 0.35 | 0.25 | 0.60 |
| **Total** | 0.60 | 0.40 | 1.00 |

Let be the event that a student is in Year 12, and the event that they bring a packed lunch. What is the probability that the student is Year 12, given they bring a packed lunch?

## Q2

Use the multiplication rule to solve the following problems.

#### 2.1.

A bag contains green sweets and yellow sweets. Two sweets are picked one after the other without replacement. What is the probability that both sweets are green?

#### 2.2.

In a factory:

* The probability a toy passes inspection is
* The probability it passes a second inspection given it passed the first is

What is the probability that a toy passes both inspections?

#### 2.3.

A coin is flipped, and then a die is rolled.

* The probability of getting heads on the coin is
* The probability of rolling a on the die is

What is the probability of getting heads and rolling a ?

#### 2.4.

In a survey:

* of people like tea
* of tea-drinkers also like coffee

What is the probability that a randomly chosen person likes both tea and coffee?

## Q3

Decide whether the following events are independent.

#### 3.1.

In a study:



Are and independent? Justify your answer.

#### 3.2.

Suppose and . Are and independent? Justify your answer.

#### 3.3.

Suppose , , and . Are and independent? Justify your answer.

#### 3.4.

Suppose and . Are and independent? Justify your answer.

[After attempting the questions above, please click this link to find the answers.]

## Version history and licensing

v1.0: initial version created 05/25 by Sophie Chowgule as part of a University of St Andrews VIP project.

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