

Exercise walk-through

Introduction to Random Variables and Probability Distributions ■ 4.7

eXercise

You must be able to

- describe the values of a **random variable** 随机变量 as numerical outcomes
- explain that a **discrete random variable** 离散随机变量 has countable values whose probabilities sum to 1
- represent a **probability distribution** 概率分布 as a table, graph, or function

Method — Random variables

The values of a **random variable** are the numerical outcomes of a random process. A **discrete** random variable can take only a **countable** number of values, each with a probability.

Method — The key rule

The probabilities of all possible values must **sum to 1**. A **probability distribution** lists the values and their probabilities (as a table, graph, or function).

Practice 2.1 ■ 1 mark

State what the probabilities in a discrete distribution must sum to.

Solution 2.1

Method: The key rule

Worked steps

1 **B1**.

Practice 2.2 ■ 2 marks

A random variable X has $P(0) = 0.2$, $P(1) = 0.5$, and $P(2) = ?$. Find the missing probability.

Solution 2.2

Method: Random variables

Worked steps

$$P(2) = 1 - 0.2 - 0.5 = 0.3 \quad \text{M1} \quad \text{A1}.$$

Practice 2.3 ■ 1 mark

Define a discrete random variable.

Solution 2.3

Method: Random variables

Worked steps

a variable that can take only a countable number of numerical values, each with a probability **B1**.

Exam-style 3.1 ■ 1 mark

The probabilities of a discrete random variable sum to

A 0

B 1

C 100

D the mean

Solution 3.1

Method: Random variables

A 0

B 1



C 100

D the mean

Worked steps

B.

Exam-style 3.2 ■ 1 mark

A discrete random variable takes

- A** any real value
- B** a countable number of values
- C** only 0 or 1
- D** only negative values

Solution 3.2

Method: Random variables

- A any real value
- B a countable number of values
- C only 0 or 1
- D only negative values



Worked steps

B.

Exam-style 3.3 ■ 2 marks

X has $P(1) = 0.3$, $P(2) = 0.4$, and $P(3) = ?$.

- (a) Find $P(3)$.
- (b) State what all the probabilities must sum to.

Solution 3.3

Method: The key rule

Worked steps

(a) $P(3) = 1 - 0.3 - 0.4 = 0.3$ **M1** **A1**. (b) 1 **B1**.