AP STATISTICS • EXERCISE SHEET

4.7 Introduction to Random Variables and Probability Distributions

Name: _____ Class: _____ Date: _____ **Total: 9 marks**

Objective

Build the skills to answer exam questions on **random variables and probability distributions**.

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

1 Worked examples

Study these first. Each one shows the method for a question type used later.

■ 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.

■ 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).

2 Practice

2.1 State what the probabilities in a discrete distribution must sum to. [1]

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

2.3 Define a discrete random variable. [1]

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3 Exam-style questions

3.1 The probabilities of a discrete random variable sum to [1]

- **A** 0
- **B** 1
- **C** 100
- **D** the mean

3.2 A discrete random variable takes [1]

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

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

(a) Find $P(3)$. [2]

(b) State what all the probabilities must sum to. [1]

4 Go further

- work through the **4.7 Introduction to Random Variables and Probability Distributions** lesson on the **Learn** page;
- read the **Probability, Random Variables, and Probability Distributions** section of the AP Statistics handout on the **Know** page.

Solutions

2.1 1.

2.2 $P(2) = 1 - 0.2 - 0.5 = 0.3$.

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

3.1 B.

3.2 B.

3.3 (a) $P(3) = 1 - 0.3 - 0.4 = 0.3$. (b) 1.