AP STATISTICS • EXERCISE SHEET

4.1 Introducing Statistics: Random and Non-Random Patterns?

Name: _____ Class: _____ Date: _____ **Total: 8 marks**

KEY WORDS random 随机 • random process 随机过程 • probability 概率

Objective

Build the skills to answer exam questions on **random and non-random patterns**.

You must be able to:

- explain that a **random process** 随机过程 is unpredictable in the short run but patterned in the long run
- distinguish **random** from **non-random** patterns
- give examples of random processes

1 Worked examples

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

■ Random processes

A single outcome of a **random process** cannot be predicted, but over **many** repetitions a stable pattern emerges — this long-run regularity is what probability describes.

■ Random vs non-random

A **coin flip** is random (each result unpredictable); a fixed daily schedule is **non-random** (predictable).

2 Practice

2.1 State what happens to a random process's behaviour in the long run. [1]

2.2 State the difference between random and non-random patterns. [1]

2.3 Give one example of a random process. [1]

3 Exam-style questions

3.1 A random process is unpredictable in the short run but shows a pattern [1]

- **A** never
- **B** in the long run
- **C** only once
- **D** immediately

3.2 Which of these is a random process? [1]

- **A** the exact sunrise time tomorrow
- **B** a coin flip
- **C** a fixed timetable
- **D** the value of $2 + 2$

3.3 A fair coin is flipped many times.

(a) State whether the result of a single flip is predictable. [1]

(b) State what emerges over many flips. [1]

(c) State the long-run proportion of heads for a fair coin. [1]

Solutions

2.1 it settles into a stable, predictable pattern (relative frequency).

2.2 a random pattern is unpredictable in the short run; a non-random one is predictable.

2.3 a coin flip, a die roll, or drawing a card (any one).

3.1 B.

3.2 B.

3.3 (a) no. (b) a stable pattern — about half heads. (c) 0.5.