

Exercise walk-through

Introducing Statistics: Random and Non-Random Patterns? ■ 4.1

eXercise

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

Method — 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.

Method — Random vs non-random

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

Practice 2.1 ■ 1 mark

State what happens to a random process's behaviour in the long run.

Solution 2.1

Method: Random processes

Worked steps

it settles into a stable, predictable pattern (relative frequency) **B1**.

Practice 2.2 ■ 1 mark

State the difference between random and non-random patterns.

Solution 2.2

Worked steps

a random pattern is unpredictable in the short run; a non-random one is predictable
B1.

Practice 2.3 ■ 1 mark

Give one example of a random process.

Solution 2.3

Method: Random processes

Worked steps

a coin flip, a die roll, or drawing a card (any one) **B1**.

Exam-style 3.1 ■ 1 mark

A random process is unpredictable in the short run but shows a pattern

A never

B in the long run

C only once

D immediately

Solution 3.1

Method: Random processes

A never

B in the long run



C only once

D immediately

Worked steps

B.

Exam-style 3.2 ■ 1 mark

Which of these is a random process?

A the exact sunrise time tomorrow

B a coin flip

C a fixed timetable

D the value of $2 + 2$

Solution 3.2

Method: Random processes

A the exact sunrise time tomorrow

B a coin flip



C a fixed timetable

D the value of $2 + 2$

Worked steps

B.

Exam-style 3.3 ■ 1 mark

A fair coin is flipped many times.

- (a) State whether the result of a single flip is predictable.
- (b) State what emerges over many flips.
- (c) State the long-run proportion of heads for a fair coin.

Solution 3.3

Method: Random processes

Worked steps

(a) no **B1**. (b) a stable pattern — about half heads **B1**. (c) 0.5 **B1**.