Exercise walk-through

Introducing Statistics: Are My Results Unexpected? ▪ 8.1

eXercise

You must be able to

- explain that a **chi-square 卡方** test compares **observed** counts to **expected** counts
- describe **observed counts 观测计数** and **expected counts 期望计数**
- recognise that chi-square tests are for **categorical** data

Method — Chi-square tests

A **chi-square** test judges whether **observed** counts differ from what we would **expect** if a claim were true.

- **Observed counts** — what the data actually show in each category.
- **Expected counts** — what we would predict under the null hypothesis.

Large gaps between observed and expected point to a real effect. Chi-square tests are used for **categorical** data (counts).

Method — A worked comparison

A die is rolled 60 times. If it is fair, each face is **expected** 10 times. Suppose a six is **observed** 18 times: the gap $(18 - 10)$ is large, hinting the die is not fair. Chi-square adds up these gaps across all six faces to give one number.

Practice 2.1 ▪ 1 mark

State what a chi-square test compares.

Solution 2.1

Method: Chi-square tests

Worked steps

observed counts with the counts expected under the null hypothesis B1.

Practice 2.2 ▪ 1 mark

State what “observed counts” are.

Solution 2.2

Method: Chi-square tests

Worked steps

the counts that actually occur in each category of the data B1.

Practice 2.3 ▪ 1 mark

State what “expected counts” are.

Solution 2.3

Method: Chi-square tests

Worked steps

the counts predicted in each category if the null hypothesis were true B1.

Exam-style 3.1 ▪ 1 mark

A chi-square test compares observed counts to

A means

B expected counts

C slopes

D proportions directly

Solution 3.1

Method: Chi-square tests

A means

B expected counts ✓

C slopes

D proportions directly

Worked steps

B.

Exam-style 3.2 ▪ 1 mark

Chi-square tests are used for _____ data.

A quantitative

B categorical

C continuous

D paired

Solution 3.2

Method: Chi-square tests

A quantitative

B categorical ✓

C continuous

D paired

Worked steps

B.

Exam-style 3.3 ▪ 1 mark

A die is rolled 60 times to test whether it is fair.
(a) Name the kind of data collected.
(b) State the expected count for each face.
(c) Name the test comparing observed to expected counts.

Solution 3.3

Worked steps

(a) categorical (counts of each face) B1. (b) $60 \div 6 = 10$ B1. (c) a chi-square (goodness-of-fit) test B1.