Exercise walk-through

Setting Up a Chi-Square Goodness of Fit Test ▪ 8.2

eXercise

You must be able to

- state the hypotheses for a goodness-of-fit test
- calculate **expected counts** as $n \cdot p_i$
- write the statistic $\chi^2 = \sum \frac{(O-E)^2}{E}$

Method — Hypotheses

- **Null** H_0: the distribution **matches** the claimed proportions.
- **Alternative** H_a: at least one proportion is different.

Method — Expected counts and the statistic

The expected count in a category is $E = n \cdot p_i$. The test statistic is

$$\chi^2 = \sum \frac{(O - E)^2}{E},$$

with degrees of freedom $=$ (number of categories) $- 1$.

Practice 2.1 ▪ 1 mark

State the null hypothesis for a goodness-of-fit test.

Solution 2.1

Worked steps

the distribution matches the claimed proportions B1.

Practice 2.2 ▪ 1 mark

Write the formula for an expected count.

Solution 2.2

Method: Expected counts and the statistic

Worked steps

$E = n \cdot p_i$ B1.

Practice 2.3 ▪ 2 marks

For $n = 200$ and a claimed proportion of 0.25, find the expected count.

Solution 2.3

Worked steps

$E = 200 \times 0.25 = 50$ M1 A1.

Exam-style 3.1 ▪ 1 mark

The expected count for a category is

A n

B $n \cdot p_i$

C $O - E$

D $\sqrt{n}$

Solution 3.1

Method: Expected counts and the statistic

A n

B $n \cdot p_i$ ✓

C $O - E$

D $\sqrt{n}$

Worked steps

B.

Exam-style 3.2 ▪ 1 mark

The chi-square statistic is

A $\sum \dfrac{(O-E)^2}{E}$

B $\sum (O-E)$

C $\sum \dfrac{O}{E}$

D $\sqrt{O-E}$

Solution 3.2

A $\sum \frac{(O-E)^2}{E}$ ✓

B $\sum (O-E)$

C $\sum \frac{O}{E}$

D $\sqrt{O-E}$

Worked steps

A.

Exam-style 3.3 ▪ 2 marks

A fair die is rolled 120 times.
(a) State the expected count for each face.
(b) Write the chi-square statistic formula.

Solution 3.3

Method: Expected counts and the statistic

Worked steps

(a) $120 \times \frac{1}{6} = 20$ M1 A1. (b) $\chi^2 = \sum \frac{(O-E)^2}{E}$ B1.