

Exercise walk-through

Expected Counts in Two-Way Tables ■ 8.4

eXercise

You must be able to

- calculate an expected count as $E = \frac{(\text{row total})(\text{column total})}{\text{grand total}}$
- explain that expected counts assume **no association** between the variables

Method — Expected counts

For each cell of a two-way table, if the two variables were **not associated** (the null hypothesis):

$$E = \frac{(\text{row total})(\text{column total})}{\text{grand total}}.$$

Method — Example

A cell with row total 40, column total 50, and grand total 200: $E = \frac{40 \times 50}{200} = 10$.

Practice 2.1 ■ 1 mark

Write the formula for an expected count in a two-way table.

Solution 2.1

Method: Expected counts

Worked steps

$$E = \frac{(\text{row total})(\text{column total})}{\text{grand total}} \quad \text{B1}.$$

Practice 2.2 ■ 2 marks

A cell has row total 60, column total 80, grand total 240. Find the expected count.

Solution 2.2

Method: Expected counts

Worked steps

$$E = \frac{60 \times 80}{240} = 20 \text{ (M1) (A1)}.$$

Practice 2.3 ■ 1 mark

State what expected counts assume.

Solution 2.3

Method: Expected counts

Worked steps

that there is no association between the two variables **B1**.

Exam-style 3.1 ■ 1 mark

The expected count in a two-way table cell is

A $\frac{(\text{row})(\text{column})}{\text{grand total}}$

B $\text{row} + \text{column}$

C the observed count

D $\text{grand total} \div 2$

Solution 3.1

Method: Expected counts

A $\frac{(\text{row})(\text{column})}{\text{grand total}}$



B row + column

C the observed count

D grand total $\div 2$

Worked steps

A.

Exam-style 3.2 ■ 1 mark

Expected counts are computed assuming

- A** an association
- B** no association (the null hypothesis)
- C** bias
- D** unequal sample sizes

Solution 3.2

Method: Expected counts

- A an association
- B no association (the null hypothesis)**
- C bias
- D unequal sample sizes



Worked steps

B.

Exam-style 3.3 ■ 2 marks

In a table, a cell has row total 50, column total 100, grand total 250.

- (a) Find the expected count.
- (b) State the assumption behind it.

Solution 3.3

Method: Expected counts

Worked steps

(a) $E = \frac{50 \times 100}{250} = 20$ **M1** **A1**. (b) no association between the variables **B1**.