

Exercise walk-through

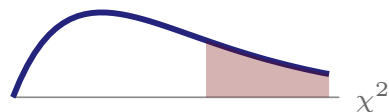
8.2

Setting Up a Chi-Square Goodness of Fit Test

AP Statistics

What we will cover

- 1 The chi-square idea
- 2 Goodness-of-fit test
- 3 Two-way tables
- 4 Homogeneity vs independence
- 5 Choosing a procedure



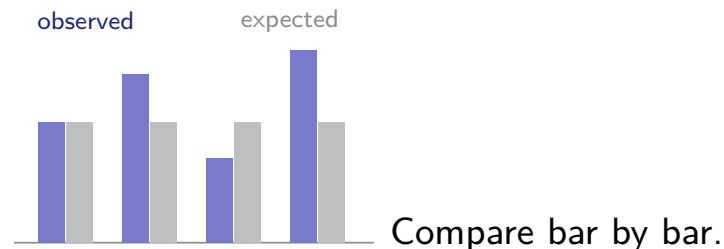
The chi-square idea

The **chi-square** tests compare counts:

- **observed** – what happened
- **expected** – what the null predicts

Big gaps $\Rightarrow$ doubt the claim.

Goodness-of-fit checks
one variable; a **two-way table**
checks two.



Check yourself

- 1 Write the chi-square statistic formula.
- 2 What is the df for a goodness-of-fit with 6 categories?
- 3 How do you find an expected count in a two-way table?
- 4 Several separate samples, one variable: which test?



Answers 1. $\chi^2 = \sum (O - E)^2 / E$ 2. $6 - 1 = 5$ 3. row $\times$ col / grand total 4. homogeneity

Exercises 2.1-2.3

2.1 State the null hypothesis for a goodness-of-fit test. [1]

2.2 Write the formula for an expected count. [1]

2.3 For $n = 200$ and a claimed proportion of 0.25, find the expected count. [2]

Exercises 2.1-2.3

2.1 State the null hypothesis for a goodness-of-fit test. [1]

2.1

- the distribution matches the claimed proportions
-

2.2 Write the formula for an expected count. [1]

2.2

- $E = n \cdot p_i$
-

2.3 For $n = 200$ and a claimed proportion of 0.25, find the expected count. [2]

2.3

- $E = 200 \times 0.25 = 50$

Exercise 3.1

3.1 The expected count for a category is

[1]

☐

A n

B $n \cdot p_i$

C $O - E$

D $\sqrt{n}$

Exercise 3.1

3.1 The expected count for a category is

[1]

☐

A n

B $n \cdot p_i$

C $O - E$

D $\sqrt{n}$

3.1 B

- $n \cdot p_i$.

Exercise 3.2

3.2 The chi-square statistic is

[1]

☐

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

B $\sum (O - E)$

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

D $\sqrt{O - E}$

Exercise 3.2

3.2 The chi-square statistic is

[1]

- ☐ **A** $\sum \frac{(O - E)^2}{E}$
- B** $\sum (O - E)$
- C** $\sum \frac{O}{E}$
- D** $\sqrt{O - E}$

3.2 A

• $\sum \frac{(O - E)^2}{E}.$

Exercise 3.3 (a)

3.3 A fair die is rolled 120 times.

(a) State the expected count for each face.

[2]

Exercise 3.3 (a)

3.3 A fair die is rolled 120 times.

(a) State the expected count for each face.

[2]

(a)

- $120 \times \frac{1}{6} = 20$

Exercise 3.3 (b)

3.3 A fair die is rolled 120 times.

(b) Write the chi-square statistic formula.

[1]

Exercise 3.3 (b)

3.3 A fair die is rolled 120 times.

(b) Write the chi-square statistic formula.

[1]

(b)

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