

Exercise walk-through

Confidence Intervals for the Difference of Two Proportions ■ 6.8

eXercise

You must be able to

- use the point estimate $\hat{p}_1 - \hat{p}_2$
- build the interval $(\hat{p}_1 - \hat{p}_2) \pm z^* \sqrt{\frac{\hat{p}_1(1 - \hat{p}_1)}{n_1} + \frac{\hat{p}_2(1 - \hat{p}_2)}{n_2}}$
- use the interval to judge whether the two proportions differ

Method — The two-proportion interval

$$(\hat{p}_1 - \hat{p}_2) \pm z^* \sqrt{\frac{\hat{p}_1(1 - \hat{p}_1)}{n_1} + \frac{\hat{p}_2(1 - \hat{p}_2)}{n_2}}.$$

Method — Judging a difference

If the interval **contains** 0, the two proportions may not differ (no significant difference). If it is **entirely above (or below)** 0, there is a significant difference.

Practice 2.1 ■ 1 mark

Write the point estimate for the difference of two proportions.

Solution 2.1

Method: Judging a difference

Worked steps

$$\hat{p}_1 - \hat{p}_2 \quad \text{B1}.$$

Practice 2.2 ■ 1 mark

State how to judge whether the two proportions differ using the interval.

Solution 2.2

Method: Judging a difference

Worked steps

if the interval contains 0, there is no significant difference; if not, there is **B1**.

Practice 2.3 ■ 1 mark

For $\hat{p}_1 = 0.6$ and $\hat{p}_2 = 0.5$, find the point estimate of the difference.

Solution 2.3

Worked steps

$$0.6 - 0.5 = 0.1 \quad \text{B1}.$$

Exam-style 3.1 ■ 1 mark

A confidence interval for $p_1 - p_2$ is centred on

A $\hat{p}_1 \cdot \hat{p}_2$

B $\hat{p}_1 - \hat{p}_2$

C 0

D $\hat{p}_1 + \hat{p}_2$

Solution 3.1

A $\hat{p}_1 \cdot \hat{p}_2$

B $\hat{p}_1 - \hat{p}_2$



C 0

D $\hat{p}_1 + \hat{p}_2$

Worked steps

B.

Exam-style 3.2 ■ 1 mark

If a 95% CI for $p_1 - p_2$ contains 0, the two proportions

- A** definitely differ
- B** may not differ (no significant difference)
- C** are exactly equal
- D** are both zero

Solution 3.2

Method: Judging a difference

- A definitely differ
- B may not differ (no significant difference)** 
- C are exactly equal
- D are both zero

Worked steps

B.

Exam-style 3.3 ■ 1 mark

A 95% CI for $p_1 - p_2$ is $(0.02, 0.10)$.

- (a) State which proportion is larger.
- (b) State whether 0 is in the interval.
- (c) State whether there is a significant difference.

Solution 3.3

Method: Judging a difference

Worked steps

(a) p_1 (the interval is positive) **B1**. (b) no **B1**. (c) yes **B1**.