

Exercise walk-through

Justifying a Claim About the Slope of a Regression Model Based on a Confidence Interval ■ 9.3

eXercise

You must be able to

- use a CI for the slope to judge whether a **linear relationship** exists
- recognise that an interval containing 0 means **no significant linear relationship**

Method — Using the slope interval

The confidence interval gives the plausible values of the true slope β :

- if it **contains** 0, there is **no significant linear relationship** (β could be 0);
- if it is entirely **positive** or **negative**, there **is** a significant linear relationship.

Method — Reading a worked interval

Regression output gives the slope's 95% interval as (0.4, 1.6). It is entirely **positive** and excludes 0, so there **is** a significant positive linear relationship. An interval of $(-0.3, 1.1)$ would contain 0 – no significant linear relationship.

Practice 2.1 ■ 1 mark

State how a CI for the slope judges “no linear relationship”.

Solution 2.1

Worked steps

if the interval contains 0, there is no significant linear relationship **B1**.

Practice 2.2 ■ 1 mark

A 95% CI for the slope is $(0.5, 1.5)$. State whether there is evidence of a linear relationship.

Solution 2.2

Worked steps

yes — the interval is entirely positive, so there is a positive linear relationship **B1**.

Practice 2.3 ■ 1 mark

State what a slope interval containing 0 implies.

Solution 2.3

Worked steps

the true slope could be 0, so no significant linear relationship **B1**.

Exam-style 3.1 ■ 1 mark

If a confidence interval for the slope contains 0, there is

- A** a strong relationship
- B** no significant linear relationship
- C** an error
- D** a curved pattern

Solution 3.1

Method: Using the slope interval

- A a strong relationship
- B no significant linear relationship
- C an error
- D a curved pattern



Worked steps

B.

Exam-style 3.2 ■ 1 mark

A 95% CI for the slope is $(1.2, 2.8)$. This suggests

- A** no relationship
- B** a positive linear relationship
- C** a negative linear relationship
- D** a curve

Solution 3.2

- A** no relationship
- B** a positive linear relationship 
- C** a negative linear relationship
- D** a curve

Worked steps

B.

Exam-style 3.3 ■ 1 mark

A 95% CI for the slope is $(-0.2, 0.6)$.

- (a) State whether 0 is in the interval.
- (b) State whether there is a significant linear relationship.
- (c) State the plausible conclusion.

Solution 3.3

Method: Using the slope interval

Worked steps

(a) yes **B1**. (b) no **B1**. (c) there is no significant linear relationship **B1**.