AP STATISTICS • EXERCISE SHEET

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

Name: _____ Class: _____ Date: _____ **Total: 8 marks**

KEY WORDS linear 线性 • regression 回归

Objective

Build the skills to answer exam questions on **justifying a claim about the slope from a confidence interval**.

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**

1 Worked examples

Study these first. Each one shows the method for a question type used later.

■ 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.

■ 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.

2 Practice

2.1 State how a CI for the slope judges “no linear relationship”. [1]

2.2 A 95% CI for the slope is $(0.5, 1.5)$. State whether there is evidence of a linear relationship. [1]

2.3 State what a slope interval containing 0 implies. [1]

3 Exam-style questions

3.1 If a confidence interval for the slope contains 0, there is [1]

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

3.2 A 95% CI for the slope is $(1.2, 2.8)$. This suggests [1]

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

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

(a) State whether 0 is in the interval. [1]

(b) State whether there is a significant linear relationship. [1]

(c) State the plausible conclusion. [1]

Solutions

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

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

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

3.1 B.

3.2 B.

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