

9.1 Introducing Statistics: Do Those Points Align?

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

KEY WORDS linear 线性 • sample slope 样本斜率 • inference 推断 • regression 回归
• true (population) slope 总体斜率

Objective

Build the skills to answer exam questions on **inference for the slope of a regression model**.

You must be able to:

- explain that inference for the slope tests whether a **linear relationship** exists
- state that a slope of 0 means **no linear relationship**
- identify the sample slope b as an estimate of the population slope β

1 Worked examples

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

■ **The question**

Inference for regression asks whether the **true (population) slope** β is different from 0 — i.e. whether there is a real **linear relationship** between x and y .

■ **Slope of zero**

If $\beta = 0$, changes in x predict **no** change in y — no linear relationship. The **sample slope** b (from the least-squares line) is our estimate of β .

2 Practice

2.1 State what inference for the slope tests. [1]

2.2 State what a slope of 0 means for the relationship. [1]

2.3 State the parameter estimated by the sample slope b . [1]

3 Exam-style questions

3.1 Inference for regression tests whether the true slope is [1]

- **A** 1
- **B** 0 (no linear relationship)
- **C** the mean
- **D** negative

3.2 The sample slope b estimates the [1]

- **A** intercept
- **B** population slope β
- **C** correlation
- **D** residual

3.3 A regression of weight on height is analysed.

(a) Name the parameter of interest. [1]

(b) State what a slope of 0 would mean. [1]

(c) Name the value that estimates it. [1]

Solutions

2.1 whether there is a linear relationship (whether the true slope $\beta \neq 0$).

2.2 no linear relationship between x and y .

2.3 the population slope β .

3.1 B.

3.2 B.

3.3 (a) the population slope β . (b) no linear relationship between height and weight. (c) the sample slope b .