

Exercise walk-through

9.4

Setting Up a Test for the Slope of a Regression Model

AP Statistics

Test for a slope

The test asks directly whether the slope is zero:

- **null** $H_0 : \beta = 0$ (no linear relationship)
 - **alternative** $H_a : \beta >, <, \text{ or } \neq 0$
- $$t = \frac{b}{SE_b}, \quad df = n - 2$$

$\beta = 0$ means a flat line – x has no straight-line effect on y .

Study time

$b = 2.5$, $SE_b = 0.6$, $n = 20$:

$$t = \frac{2.5}{0.6} \approx 4.17$$

$df = 18$, $p \approx 0.0006$: reject – a real linear link.

Exercises 2.1-2.3

2.1 State the null hypothesis for a slope test.

[1]

2.2 Write the test-statistic formula for a slope.

[1]

2.3 For $b = 3.0$ and $SE(b) = 0.6$, find the test statistic t .

[2]

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- $H_0 : \beta = 0$
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2.2 Write the test-statistic formula for a slope.

[1]

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- $t = \frac{b}{SE(b)}$
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2.3 For $b = 3.0$ and $SE(b) = 0.6$, find the test statistic t .

[2]

2.3

- $t = \frac{3.0}{0.6} = 5.0$

Exercise 3.1

3.1 The null hypothesis in a slope test is usually

[1]

☐

A $\beta = 1$

B $\beta = 0$

C $b = 0$

D $\beta \neq 0$

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3.1 B

- $\beta = 0$.

Exercise 3.2

3.2 The test statistic for a slope is

[1]

- ☐ **A** $\frac{b}{SE(b)}$
- B** $b \cdot SE(b)$
- C** $\frac{SE(b)}{b}$
- D** $b - SE(b)$

Exercise 3.2

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- ☐ **A** $\frac{b}{SE(b)}$
- B** $b \cdot SE(b)$
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- D** $b - SE(b)$

3.2 A

• $\frac{b}{SE(b)}.$

Exercise 3.3 (a)

3.3 A regression has $b = 2.4$, $SE(b) = 0.8$, $n = 22$.

(a) Write H_0 .

[1]

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(a) Write H_0 .

[1]

(a)

- $H_0 : \beta = 0$

Exercise 3.3 (b)

3.3 A regression has $b = 2.4$, $SE(b) = 0.8$, $n = 22$.

(b) Compute t .

[2]

Exercise 3.3 (b)

3.3 A regression has $b = 2.4$, $SE(b) = 0.8$, $n = 22$.

(b) Compute t .

[2]

(b)

- $t = \frac{2.4}{0.8} = 3.0$

Exercise 3.3 (c)

3.3 A regression has $b = 2.4$, $SE(b) = 0.8$, $n = 22$.

(c) State the degrees of freedom.

[1]

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[1]

(c)

- $n - 2 = 20$