AP STATISTICS • EXERCISE SHEET

9.2 Confidence Intervals for the Slope of a Regression Model

Name: _____ Class: _____ Date: _____ **Total: 9 marks**

Objective

Build the skills to answer exam questions on **a confidence interval for the slope**.

You must be able to:

- construct the interval $b \pm t^* \cdot SE(b)$
- use degrees of freedom $n - 2$
- compute the margin of error

1 Worked examples

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

■ **The interval for the slope**

$$b \pm t^* \cdot SE(b),$$

where b is the sample slope, $SE(b)$ is its standard error (from computer output), and the degrees of freedom are $n - 2$.

■ **Example**

$b = 2.5$, $SE(b) = 0.5$, $t^* = 2.05$: ME $= 2.05 \times 0.5 = 1.025$.

2 Practice

2.1 Write the confidence-interval formula for the slope. [1]

2.2 State the degrees of freedom for slope inference with $n = 30$. [1]

2.3 $b = 2.5$, $SE(b) = 0.5$, $t^* = 2.05$. Find the margin of error. [2]

3 Exam-style questions

3.1 A confidence interval for the slope uses [1]

- **A** z^*
- **B** t^* with $\text{df} = n - 2$
- **C** χ^2
- **D** no critical value

3.2 The degrees of freedom for inference about a slope is [1]

- **A** n
- **B** $n - 1$
- **C** $n - 2$
- **D** $2n$

3.3 $b = 1.8$, $SE(b) = 0.4$, $n = 25$, $t^* = 2.07$.

(a) Find the margin of error. [2]

(b) Give the confidence interval. [1]

4 Go further

- work through the **9.2 Confidence Intervals for the Slope of a Regression Model** lesson on the **Learn** page;
- read the **Inference for Quantitative Data: Slopes** section of the AP Statistics handout on the **Know** page.

Solutions

2.1 $b \pm t^* \cdot SE(b)$.

2.2 $n - 2 = 28$.

2.3 ME $= 2.05 \times 0.5 = 1.025$.

3.1 B.

3.2 C.

3.3 (a) ME $= 2.07 \times 0.4 = 0.828$. (b) $(0.97,\ 2.63)$.