



AP Statistics FRQ Practice · Unit 9

Practice Hours and Test Scores · numberbender.com

Name: _____

Date: _____

Score: / 4

What this question practices

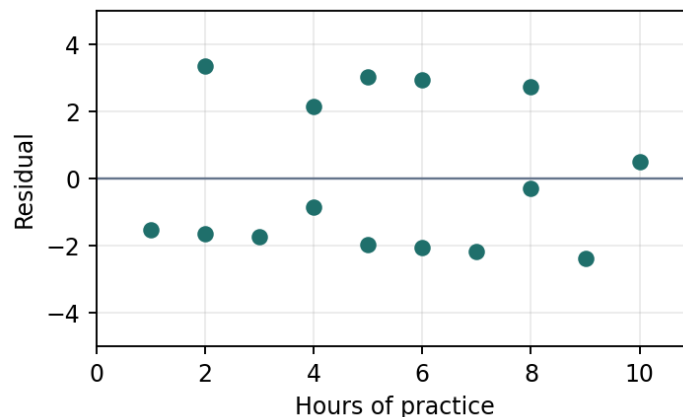
- Reading the slope and its standard error from computer output
- Constructing and interpreting a t interval for the slope
- Using an interval as evidence of a linear relationship
- Checking conditions with a residual plot

Show all your work. Answer each part in complete sentences, in the context of the problem. The data are hypothetical.
Suggested time: 13 minutes.

A random sample of 15 students was selected from a large high school. For each student, a teacher recorded the number of hours spent on practice worksheets in the week before a unit test (x) and the student's test score as a percent (y). Computer output from a least-squares regression and a residual plot are shown.

Predictor	Coef	SE Coef	T	P
Constant	60.4323	1.3455	44.91	0.000
Hours	3.1065	0.2264	13.72	0.000

$S = 2.301$ $R\text{-Sq} = 93.5\%$



(a) Construct a 95% confidence interval for the slope of the population regression line relating test score to hours of practice.



(b) Interpret the interval in context.

(c) Does the interval provide convincing evidence of a positive linear relationship between hours of practice and test score for all students at the school? Explain.

(d) Explain what the residual plot tells you about the conditions for inference about the slope.





Each part is scored *E* (essentially correct), *P* (partially correct) or *I* (incorrect), the way AP readers score free-response questions. Compare your work with the model solution, then with the scoring note.

(a) Construct a 95% confidence interval for the slope of the population regression line relating test score to hours of practice.

→ The slope is 3.1065 and its standard error is 0.2264 (the Hours row).

→ With $n = 15$, $df = 15 - 2 = 13$, so $t^* = 2.160$ for 95% confidence.

$$b \pm t^*SE_b = 3.1065 \pm 2.160(0.2264)$$

(2.62, 3.60)

→ 3.1065 ± 0.489 gives about 2.62 to 3.60.

Scoring. Essentially correct: correct values from the output, correct df and t^* , and the correct interval.

(b) Interpret the interval in context.

→ We are 95% confident that the interval from 2.62 to 3.60 captures the slope of the population regression line.

→ That is, for each additional hour of practice, the average test score for students at this school increases by between about 2.62 and 3.60 percentage points.

Scoring. Essentially correct: refers to the population slope (true average change) and gives both endpoints in context.

(c) Does the interval provide convincing evidence of a positive linear relationship between hours of practice and test score for all students at the school? Explain.

→ Yes. All values in the interval are positive, so 0 is not a plausible value for the population slope.

Scoring. Essentially correct: says yes because 0 (or any negative value) is not in the interval.

(d) Explain what the residual plot tells you about the conditions for inference about the slope.

→ The residuals are scattered randomly above and below 0 with no curved pattern, so a linear model is appropriate.

→ The spread of the residuals is about the same across all values of x , so the condition of equal standard deviation of y for each x is reasonable.

Scoring. Essentially correct: addresses both linearity (no curve) and equal variability (no fanning), referring to the plot.

