AP Statistics FRQ Practice · Unit 2

Video Minutes and Quiz Scores · numberbender.com

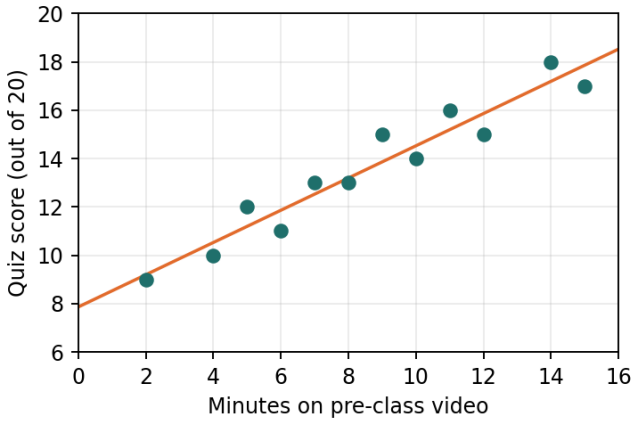
Name: _____ Date: _____ Score: / 4

What this question practices

- Writing the least-squares regression line from computer output
- Interpreting slope and r^2 in context
- Calculating and interpreting a residual

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 teacher recorded, for 12 students, the number of minutes each student spent on a pre-class video (x) and the student's score on a 20-point quiz the next day (y). The scatterplot shows a strong, positive, linear association. Computer output for the least-squares regression is shown.



Predictor	Coef	SE Coef	T	P
Constant	7.8625	0.5622	13.99	0.000
Minutes	0.6665	0.0598	11.15	0.000

S = 0.7952 R-Sq = 92.6%

(a) Write the equation of the least-squares regression line. Define any variables you use.

(b) Interpret the slope of the regression line in context.

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(c) Interpret the value of R-Sq = 92.6% in context.

(d) One student watched the video for 10 minutes and scored 14 on the quiz. Calculate and interpret this student's residual.

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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) Write the equation of the least-squares regression line. Define any variables you use.

→ Use the Constant row for the intercept and the Minutes row for the slope.

$$\widehat{\text{score}} = 7.8625 + 0.6665\,(\text{minutes})$$

→ Here, score is the predicted quiz score (out of 20) and minutes is the number of minutes spent on the pre-class video.

Scoring. Essentially correct: correct equation, with a hat (or the word predicted) on the response and both variables defined in context.

(b) Interpret the slope of the regression line in context.

→ For each additional minute a student spends on the pre-class video, the *predicted* quiz score increases by about 0.67 points.

Scoring. Essentially correct: says predicted (or average) score, gives 0.67 points per minute, and is in context. Partially correct: missing the word predicted, or stated as a certainty.

(c) Interpret the value of R-Sq = 92.6% in context.

→ About 92.6% of the variation in students' quiz scores is accounted for by the linear relationship between quiz score and minutes spent on the pre-class video.

Scoring. Essentially correct: refers to variation in quiz scores explained by the linear model with minutes. Partially correct: omits variation, the linear model, or context.

(d) One student watched the video for 10 minutes and scored 14 on the quiz. Calculate and interpret this student's residual.

→ Residual = actual score − predicted score.

$$\widehat{\text{score}} = 7.8625 + 0.6665(10) \approx 14.53$$

$$\text{residual} = 14 - 14.53 \approx -0.53$$

→ This student scored about 0.53 points lower than the regression line predicts for a student who watched 10 minutes.

Scoring. Essentially correct: correct prediction, residual of about −0.53, and an interpretation that says the actual score was below the predicted score, in context.

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