

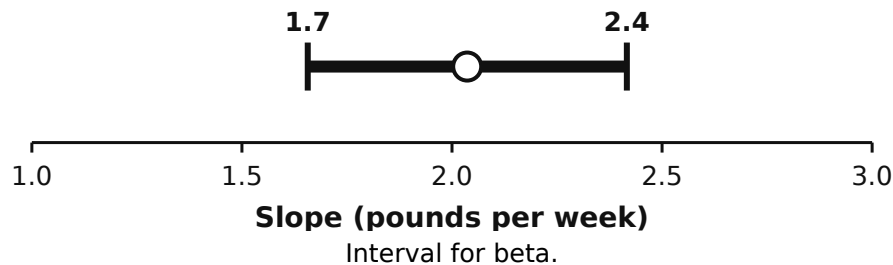
AP Statistics - Inference for the Slope of a Regression Line - Test Answer Key

Common Core AP STAT 9.1, AP STAT 9.2, AP STAT 9.3, AP STAT 9.4, AP STAT 9.5, AP STAT 9.6, HSS-ID.B.6 · maths-pdf.fr/en/

Each solution is followed by a scoring guide. Award points for correct conditions, the right df, the correct interval or test statistic, and a conclusion that mentions the true slope in context.

AP Statistics · Common Core State Standards: **AP STAT 9.1, AP STAT 9.2, AP STAT 9.3, AP STAT 9.4, AP STAT 9.5, AP STAT 9.6, HSS-ID.B.6**

Question 1 - Interval for the slope [4 pts]

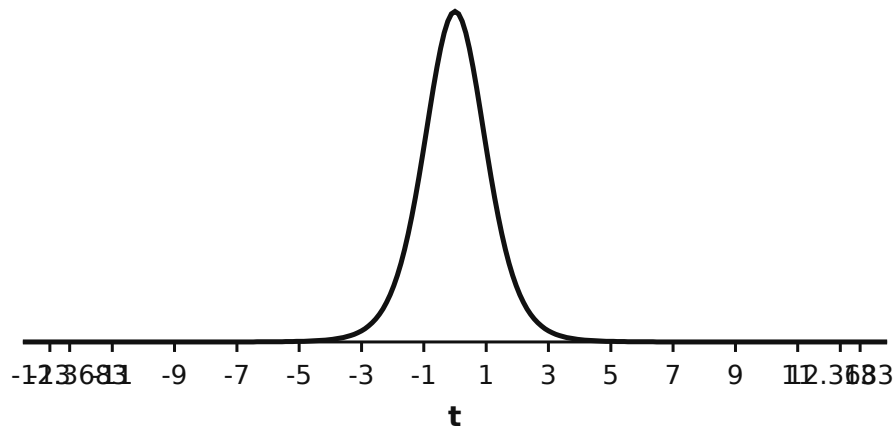


(a) $\hat{y} = 9.800 + 2.036x$; each extra week adds about 2.04 pounds to the predicted weight. (b) $df = 8$, $t^* = 2.306$, $ME = 0.380$, interval (1.657, 2.416). (c) We are 95% confident the true slope is in that interval: each extra week of training raises the mean weight lifted by that many pounds.

(1.657, 2.416) pounds per week.

Scoring: 1 point for equation and slope interpretation, 1 point for t^* and ME, 1 point for the interval, 1 point for the interpretation in context.

Question 2 - Test for the slope [4 pts]



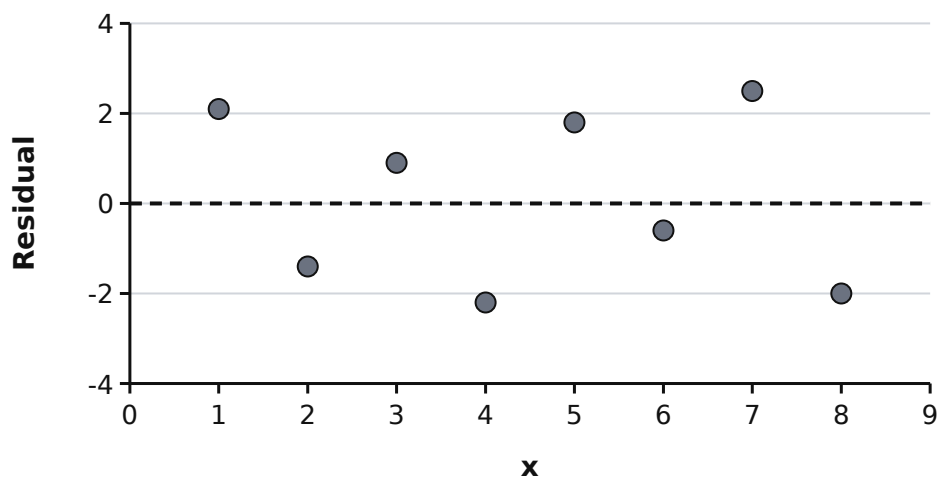
Two-sided p-value.

$H_0: \beta = 0$, $H_a: \beta \neq 0$. Conditions (LINER) are assumed checked: linear pattern, independent random sample, roughly normal residuals, equal spread. $t = 12.37$, $df = 8$, $p\text{-value} = 0.0000$.

Reject H_0 : convincing evidence of a linear relationship between weeks of training and weight lifted.

Scoring: 1 point for hypotheses with the parameter, 1 point for the conditions, 1 point for t and the p -value, 1 point for the conclusion in context.

Question 3 - Conditions [3 pts]



A residual plot.

(a) Linear (no curve) and Equal variance (constant spread). (b) No problem is visible; the spread is about the same everywhere.

Linear and Equal variance; no problem.

Scoring: 1 point for each condition, 1 point for the conclusion.

Question 4 - Interpret r squared [2 pts]

R-squared is the proportion of variation explained by the linear model.

About 95% of the variation in weight lifted is explained by its linear relationship with weeks of training.

Scoring: 1 point for the percent, 1 point for context.

Question 5 - Reading output [2 pts]

Slope 0.84, SE 0.31, $t = 2.71$, $P = 0.014$.

$0.014 < 0.05$: reject H_0 ; there is convincing evidence of a linear relationship.

Scoring: 1 point for identifying the four values, 1 point for the conclusion.

Question 6 - Interval and test [2 pts]

0 is outside the interval.

Reject H_0 : convincing evidence that beta is not 0.

Scoring: 1 point for noting 0 is outside, 1 point for the conclusion.

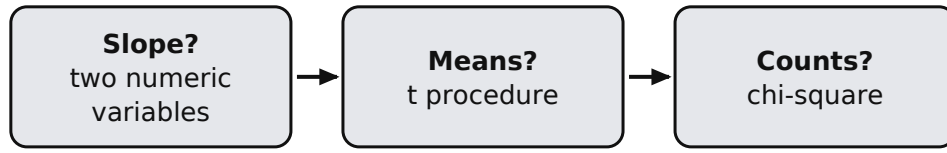
Question 7 - Degrees of freedom [1 pt]

$n - 2 = 23$.

23.

Scoring: 1 point for 23.

Question 8 - Select a procedure [2 pts]



Choosing a procedure.

(a) One-proportion z test. (b) t interval for the slope.

(a) one-proportion z test; (b) t interval for the slope of the regression line.

Scoring: 1 point each.

Total
20 points