

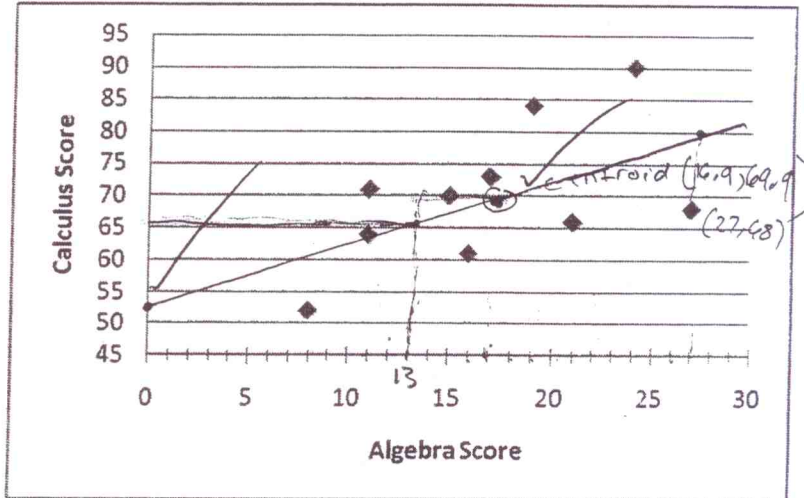
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MATH 171
Quiz 2

Student Solution

Problem I. In an observational study of the factors that are associated with success in a calculus course, data were collected for 10 different students. For each student, their score on an algebra placement test and their score on a calculus achievement test were recorded. Below are the data along with a scatterplot of the data. Please answer the following questions. (22 points total)

Algebra Score	Calculus Score
17	73
21	66
11	64
16	61
15	70
11	71
24	90
27	68
19	84
8	52



(a) Which variable is the explanatory variable? Which is the response variable? Clearly indicate your answers. (2 points)

Algebra score - explanatory
calculus score - Response

(b) Find the centroid of the data and plot it on the scatterplot. Clearly indicate the point on the graph and give its coordinates below. (2 points)

$(\bar{x}, \bar{y}) \rightarrow (16.9, 69.9)$

(c) What is the value of the linear correlation coefficient for these data? (2 points)

$r = .56$

(d) Find the equation of the least squares regression line and accurately plot it on the scatterplot. Clearly write the equation of the line below. (4 points)

$\hat{y} = 52.69 + 1.02(x)$

(e) Using the regression line, for each increase of one point in algebra score, would we expect an increase or decrease in calculus score and how much of an increase or decrease would we expect? (2 points)

There would be an increase of 1.02 points

(f) Use the regression line to predict the expected calculus score for students who have an algebra score of 13. Please show all work. Show this prediction graphically on the scatterplot by drawing the "up and over" lines. (3 points)

$\hat{y} = 52.69 + 1.02(13) = 65.93$

(g) Find the residual for the data point (27,68). (3 points)

Residual = $y - \hat{y}$
 $68 - 80.18$
 $= -12.18$

$\hat{y} = 52.69 + 1.02(27)$
 $= 80.18$

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