



AP[®] Statistics 2003 Sample Student Responses Form B

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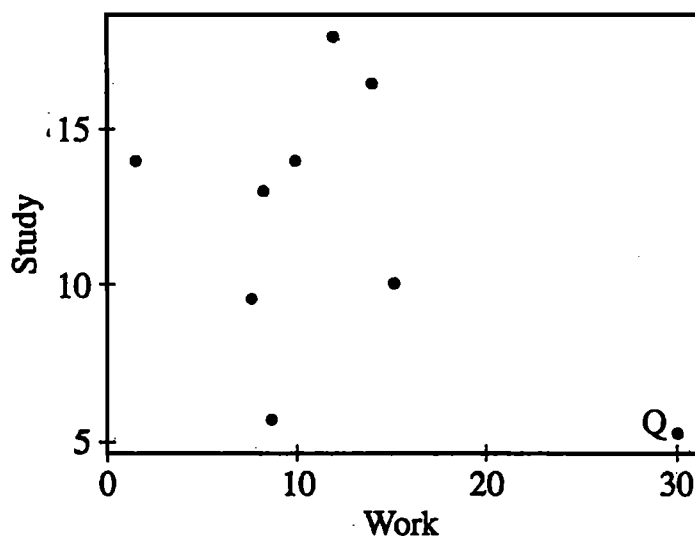
- (a) After point P, labeled on the graph on the previous page, was removed from the data, a second linear regression was performed and the computer output is shown below.

A



Predictor	Coef	StDev	T	P
Constant	11.123	3.986	2.79	0.032
Work	0.1500	0.3834	0.39	0.709
S = 4.327 R-Sq = 2.5% R-Sq (adj) = 0.0%				

Does point P exercise a large influence on the regression line? Explain.

- Yes, point P does have a large influence on the regression line. With point P, the correlation coefficient, r was equal to $.69$ ($\sqrt{.476} = .69$) which suggests a positive linear correlation. However, when point P was removed, the correlation coefficient was $.16$ ($\sqrt{.025} = .16$) which suggest that there is an extremely weak, positive linear correlation. The different values of the correlation coefficient show how strong an effect the point P had on the regression line. There are also large changes in the regression line, with P, $\hat{y} = 8.107 + .4919x$, without P $\hat{y} = 11.123 + .15x$, which is a significant change in both the y-intercept and the slope of the regression line.
- (b) The researcher who conducted the study discovered that the number of hours spent studying reported by the student represented by P was recorded incorrectly. The corrected data point for this student is represented by the letter Q in the scatterplot below.



Explain how the least squares regression line for the corrected data (in this part) would differ from the least squares regression line for the original data.

The least squares regression line including point Q would have changed from the original regression line. Firstly, the point Q would likely give the line a negative correlation coefficient and a negative slope in the regression line. Also, the y-intercept is likely to be higher and positive in the new regression line as the line will now appear like this  rather than  as the original line was.

GO ON TO THE NEXT PAGE.

B

- (a) After point P, labeled on the graph on the previous page, was removed from the data, a second linear regression was performed and the computer output is shown below.

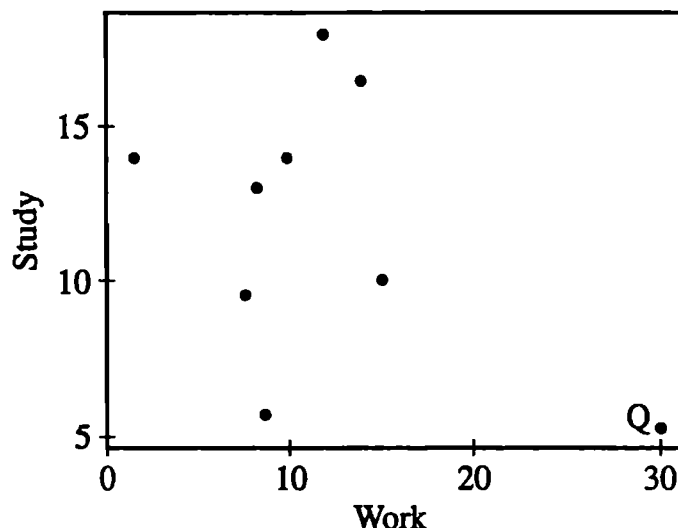
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Does point P exercise a large influence on the regression line? Explain.

Yes, because the regression line was hrs of study = .4919 (work) + 8.10
 Now it is hrs of study = .150 (work) + 11.123. Outliers are influential when they have large x values, as does point P. Influential points pull the regression line toward themselves therefore, by removing them, we get a more precise regression line.

- (b) The researcher who conducted the study discovered that the number of hours spent studying reported by the student represented by P was recorded incorrectly. The corrected data point for this student is represented by the letter Q in the scatterplot below.



Explain how the least squares regression line for the corrected data (in this part) would differ from the least squares regression line for the original data.

Point Q is considered as an influential outlier, which has a great x value. This sort of influential outlier will pull the regression line towards itself. Therefore the regression line for the correct data would be affected by point Q. This regression line would be closer to the x-axis than the original regression line.

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