

Solve the following problems showing all work ON A SEPARATE PIECE OF PAPER!!!

- 1.) Since Hill Valley High School eliminated the use of bells between classes, teachers have noticed that more students seem to be arriving to class a few minutes late. One teacher decided to collect data to determine whether the students' and teachers' watches are displaying the correct time. At exactly 12:00 noon, the teacher asked 9 randomly selected students and 9 randomly selected teachers to record the times on their watches to the nearest half minute. The ordered data showing minutes after 12:00 as positive values and minutes before 12:00 as negative values are shown in the table below.

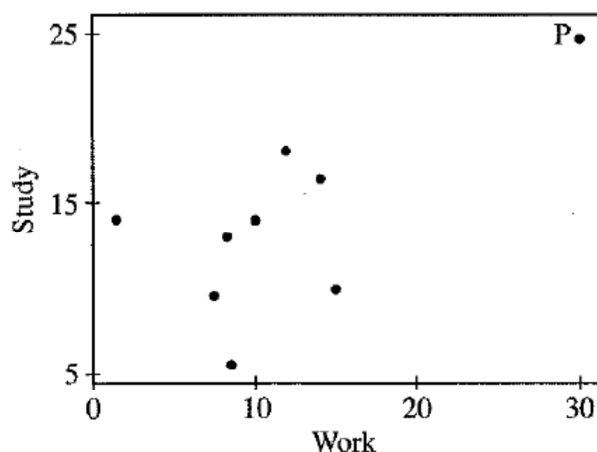
Students	-4.5	-3.0	-0.5	0	0	0.5	0.5	1.5	5.0
Teachers	-2.0	-1.5	-1.5	-1.0	-1.0	-0.5	0	0	0.5

- (a) Construct parallel boxplots using these data.
- (b) Based on the boxplots in part (a), which of the two groups, students or teachers, tends to have watch times that are closer to the true time? Explain your choice.

- 2.) A simple random sample of 9 students was selected from a large university. Each of these students reported the number of hours he or she had allocated to studying and the number of hours allocated to work each week. A least squares linear regression was performed and part of the resulting computer output is shown below.

Predictor	Coef	StDev	T	P
Constant	8.107	2.731	2.97	0.021
Work	0.4919	0.1950	2.52	0.040
S = 4.349 R-Sq = 47.6% R-Sq (adj) = 40.1%				

The scatterplot below displays the data that were collected from the 9 students.

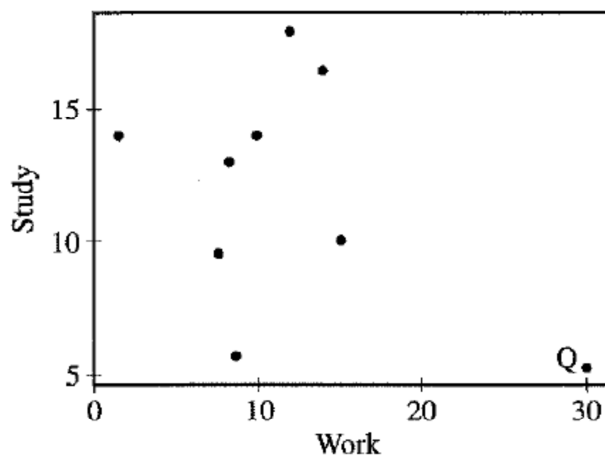


- (a) After point P, labeled on the graph on the previous page, was removed from the data, a second linear regression was performed and the computer output is shown below.

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.

- (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.

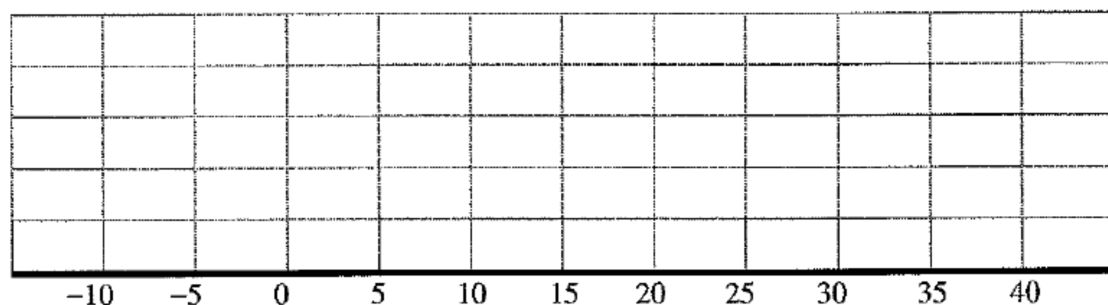
- 3.) A consumer advocate conducted a test of two popular gasoline additives, A and B. There are claims that the use of either of these additives will increase gasoline mileage in cars. A random sample of 30 cars was selected. Each car was filled with gasoline and the cars were run under the same driving conditions until the gas tanks were empty. The distance traveled was recorded for each car.

Additive A was randomly assigned to 15 of the cars and additive B was randomly assigned to the other 15 cars. The gas tank of each car was filled with gasoline and the assigned additive. The cars were again run under the same driving conditions until the tanks were empty. The distance traveled was recorded and the difference in the distance with the additive minus the distance without the additive for each car was calculated.

The following table summarizes the calculated differences. Note that negative values indicate less distance was traveled with the additive than without the additive.

Additive	Values Below Q_1	Q_1	Median	Q_3	Values Above Q_3
A	-10, -8, -2	1	3	4	5, 7, 9
B	-5, -3, -3	-2	1	25	35, 37, 40

- (a) On the grid below, display parallel boxplots (showing outliers, if any) of the differences of the two additives.



- (b) Two ways that the effectiveness of a gasoline additive can be evaluated are by looking at either

- the proportion of cars that have increased gas mileage when the additive is used in those cars
 - or
 - the mean increase in gas mileage when the additive is used in those cars.
- i. Which additive, A or B, would you recommend if the goal is to increase gas mileage in the highest proportion of cars? Explain your choice.
 - ii. Which additive, A or B, would you recommend if the goal is to have the highest mean increase in gas mileage? Explain your choice.