MATH 1342

Homework 6 (Lessons 17 - 19)

Instructions: Answer all questions through the EMCF tab of casa under the assignment named "Homework 6" before the deadline.

There is no "Submit" button. Your answers will be automatically submitted once the deadline arrives.

Assignments will be graded out of 20 points.

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1. Identify Explanatory and Response Variables: Study time and grade earned

   A. Explanatory: Grade Earned; Response: Study Time

   B. Explanatory: Study Time; Response: Grade Earned

   C. Cannot be determined

2. Would you predict these variables to have a positive correlation, a negative correlation, or no correlation, and explain how this relates to causality: Height and shoe size.

   A. Positive Trend. An increase in the explanatory variable caused an increase response variable.

   B. Positive Trend. As the explanatory variable increased so did the response variable.

   C. Negative Trend. An increase in the explanatory variable caused a decrease in the response variable.

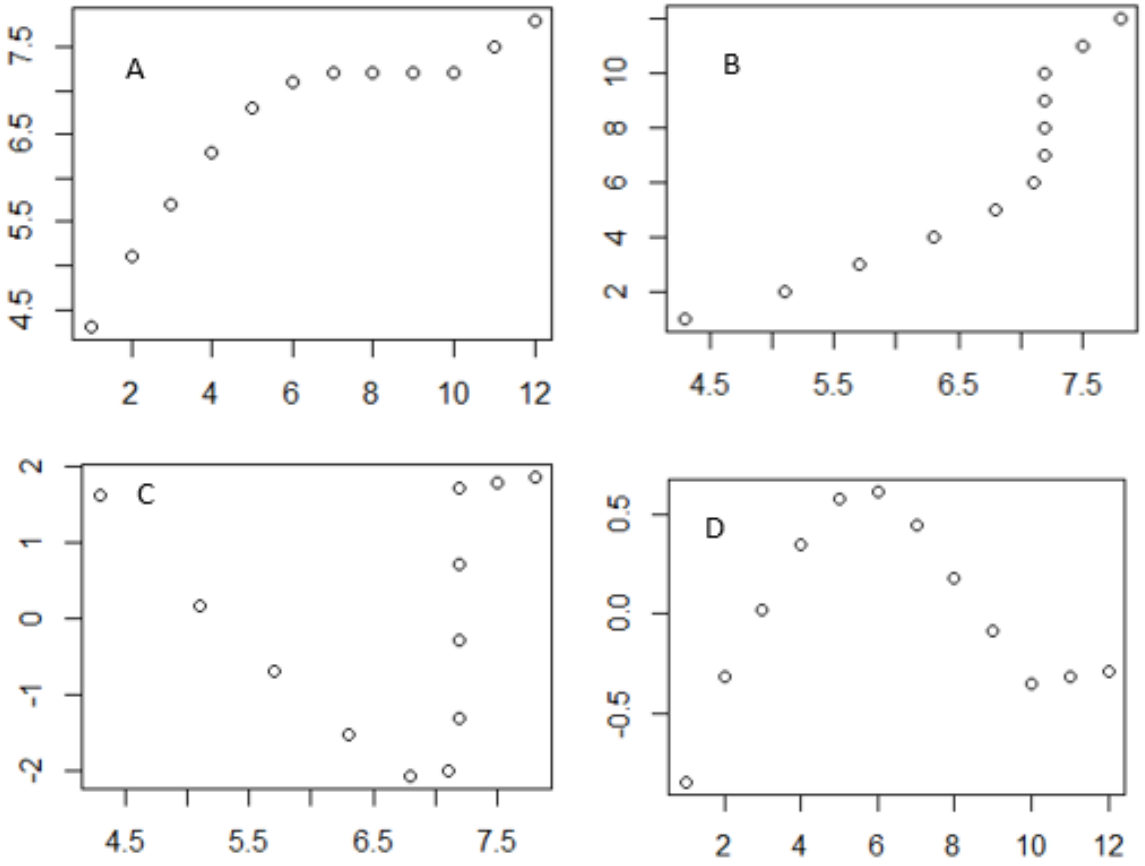
   D. Negative Trend. As the explanatory variable increased the response variable decreased.

   E. No trend.

For Questions 3 - 5, refer to the accompanying table of age and weights of 170 children in the Egyptian village of Nahya.

Age(months)	1	2	3	4	5	6	7	8	9	10	11	12
Weight (kg)	4.3	5.1	5.7	6.3	6.8	7.1	7.2	7.2	7.2	7.2	7.5	7.8

3. Construct a scatter plot.



E. None of the above options.

4. Describe the direction and shape of the trend seen in this scatter plot

A. There is a positive linear trend between the two variables.

B. There is a negative linear trend between the two variables.

C. There is a positive non-linear trend between the two variables.

D. There is a negative non-linear trend between the two variables.

E. There is no trend between the variables.

5. Would you be willing, based on this data, to predict the weight of a child at 25 months of age?

A. Yes. By following the pattern presented, we can determine an approximate weight for an age of 25 months.

B. No. Due to the fact that the graph is non-linear, it is impossible to estimate values not provided in the table of data.

C. No. Due to the fact that there were less than 30 data points in the presented data, estimating additional values would not be efficient.

D. No. Since the value in question (x = 25 months) is so far from our known data points (x = 1 to 12), we cannot make estimates with any certainty.

E. The accuracy of any estimates cannot be determined with the information provided.

Base Questions 6 - 7 on the following: The number of motor vehicles registered (in millions) in the US has grown as follows:

Year	1940	1945	1950	1955	1960	1965	1970	1975	1980	1985
Vehicles	32.4	31.0	49.2	62.7	73.9	90.4	108.4	132.9	155.8	171.7

6. Determine the value of correlation coefficient.

A. -0.9875 B. -0.6773 C. 0.0032 D. 0.6773 E. 0.9875

7. Give an interpretation of the correlation coefficient.

A. There is a strong positive relationship between the variables.

B. There is a weak positive relationship between the variables.

C. There is a strong negative relationship between the variables.

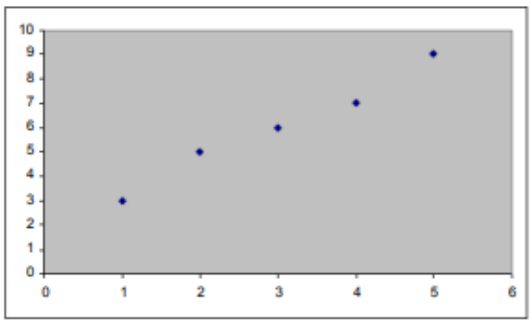
D. There is a weak negative relationship between the variables.

E. There is no relationship between the variables.

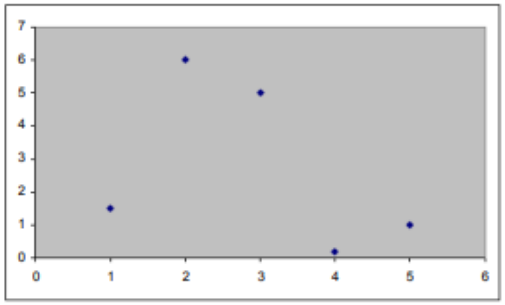
8. Estimate the correlation coefficient of the illustrated scatter plot.

A. -0.98 B. -0.85 C. 0.42

D. 0.85 E. 0.98



9. Estimate the correlation coefficient of the illustrated scatter plot.



A. -0.98 B. -0.85

C. -0.42 D. 0.85 E. 0.98

10. True or False:

a. The coefficient of determination measures the variation in the dependent variable that is explained by the regression model.

b. A student might expect a positive correlation between the age of his or her computer and its resale value.

c. The variable being predicted in a regression analysis is the independent variable.

d. The correlation coefficient, r, is always between +1 and -1.

e. If there is no correlation between variables, then the correlation coefficient must be -1.

A. TTFTF B. FFTTF C. TTTTT D. TFFTF E. FFFTF

11. A study compared the body weight of a child to metabolic rate. Use the following to create a LSRL. $\bar{x} = 12.5 \quad s_x = 6.568 \quad \bar{y} = 5.888 \quad s_y = 2.687 \quad r = 0.984$

A. $\hat{y} = 2.405x - 24.175$ B. $\hat{y} = 2.405x - 1.661$

C. $\hat{y} = 0.403x + 14.873$ D. $\hat{y} = 0.856x + 0.403$

E. $\hat{y} = 0.403x + 0.856$

12. A wildlife biologist is interested in the relationship between the number of chirps per minute for crickets (y) and temperature. Based on collected data, the LSRL is $\hat{y} = 10.53 + 3.41x$, where x is the number of degrees Fahrenheit by which the temperature exceeds 50^o. Interpret the slope of this LSRL.

A. There is an increase of 3.41 chirps per minute for every one degree increase of temperature.

B. There is an increase of 1 chirp per minute for every 3.41 degree increase in temperature.

C. There is an increase of 3.41 chirps per minute for every 50 degree increase in temperature.

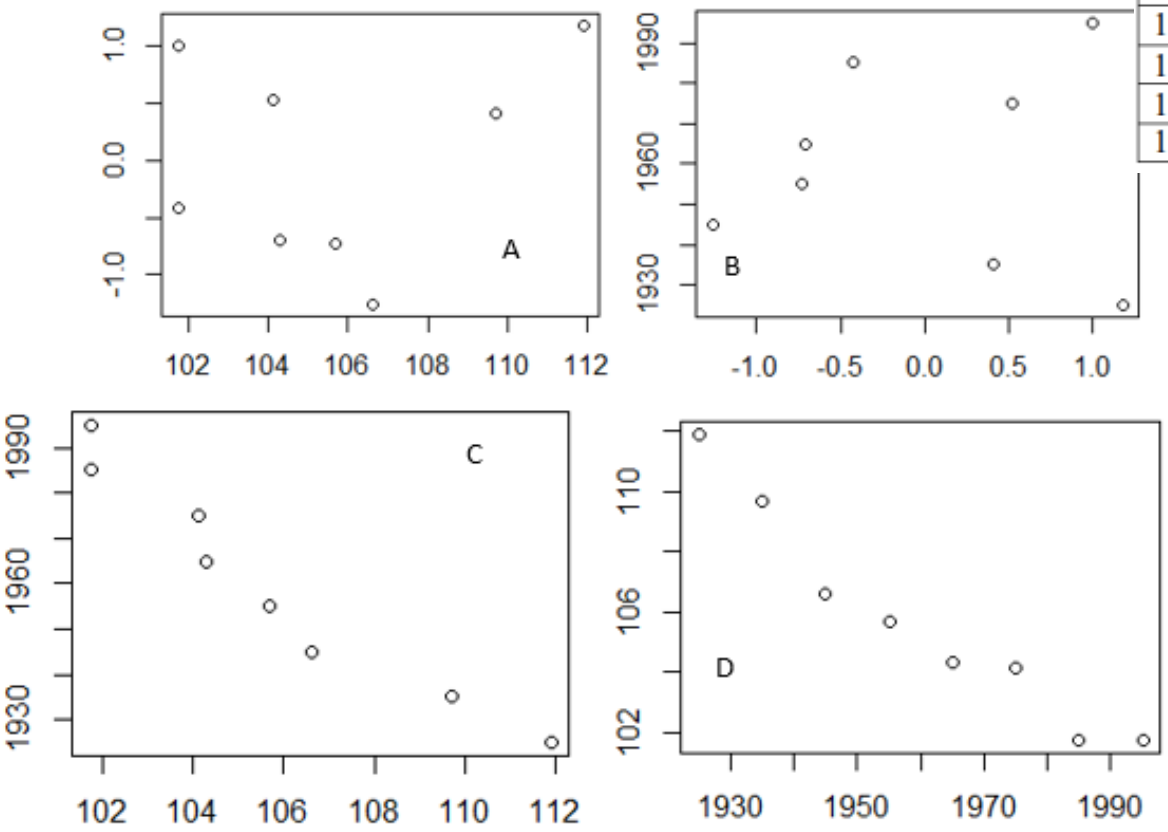
D. There is an increase of 10.53 chirps per minute for every one degree increase in temperature.

E. There is an increase of 10.53 chirps per minute for every 3.41 degree increase in temperature.

For Questions 13 - 19, refer the following: The table shows the Men's 800 Meter Run World Record Records.

Year	Record
1925	111.9
1935	109.7
1945	106.6
1955	105.7
1965	104.3
1975	104.1
1985	101.73
1995	101.73

13. Create a scatter plot of this data.



E. None of the above options

14. Construct a LSRL of this data

A. $\hat{y} = 385.58x - 0.1428$

B. $\hat{y} = -0.1428x + 385.58$

C. $\hat{y} = -6.569x + 2654.504$

D. $\hat{y} = -12.65x + 665.7$

E. $\hat{y} = 0.1428x - 385.58$

15. Interpret the slope of the LSRL in the context of this problem.

A. There is an increase of 0.1428 seconds of world record 800 meter run-times for every year elapsed.

B. There is an increase of 0.1428 seconds of world record 800 meter run-times for 385 years elapsed.

C. The increase of one year causes the world record 800 meter run-time to decrease by 0.1428 seconds.

D. There is a decrease of 0.1428 seconds of world record 800 meter run-times for every year elapsed.

E. There is a decrease of 0.1428 seconds of world record 800 meter run-times for every 385 years elapsed.

16. Determine the correlation coefficient.

A. -0.1428 B. -0.9685 C. 0.0204

D. 0.9380 E. 385.58

17. Interpret the correlation coefficent.

A. There is a strong positive relationship between the variables.

B. There is a strong negative relationship between the variables.

C. There is a weak positive relationship between the variables.

D. There is a weak negative relationship between the variables.

E. There is no relationship between the variables.

18. Find the coefficient of determination.

A. 0.0204 B. 19.636 C. 0.9841

D. 0.9380 E. 0.1428

19. Interpret the coefficient of determination.

A. Roughly, 98% of the variation in world record times is explained by the Least Square Regression Line.

B. This shows that there is a strong, positive relationship between the passage of time and the variation in world record times.

C. Roughly, 93% of the variation in world record times is explained by the Least Square Regression Line.

D. We can say, with 93% certainty, that the passage of years causes the change in the world record times.

E. We can say, with 98% certainty, that the decreasing world record times is caused by the unidirectional progression of years.

20. For a set of data: x = (0,1,2,3,4,5,6) and y = (36, 28, 25, 24, 23, 21, 19), determine and interpret the correlation coefficient.

Proposed Solution:

assign("x", c(0,1,2,3,4,5,6))

assign("y",c(36, 28, 25, 24, 23, 21, 19))

cor(x,y) = -0.92638

Interpretation: This means that an increase of x causes a decrease in y.

What was done wrong in the proposed solution?

A. The correlation coefficient is calculated by cor(x,y)^2.

B. The correlation coefficient is calculated by sqrt(cor(x,y)).

C. The correlation coefficient is calculated correctly, but the interpretation should indicate that an increase of x caused an increase in y.

D. The correlation coefficient is calculated correctly, but the interpretation should only indicate that there is a negative trend between x and y.

E. The proposed solution is correct.