

A2.S.8: Correlation Coefficient: Interpret within the linear regression model the value of the correlation coefficient as a measure of the strength of the relationship

- 1 Which statement regarding correlation is *not* true?
 - 1) The closer the absolute value of the correlation coefficient is to one, the closer the data conform to a line.
 - 2) A correlation coefficient measures the strength of the linear relationship between two variables.
 - 3) A negative correlation coefficient indicates that there is a weak relationship between two variables.
 - 4) A relation for which most of the data fall close to a line is considered strong.
- 2 A study compared the number of years of education a person received and that person's average yearly salary. It was determined that the relationship between these two quantities was linear and the correlation coefficient was 0.91. Which conclusion can be made based on the findings of this study?
 - 1) There was a weak relationship.
 - 2) There was a strong relationship.
 - 3) There was no relationship.
 - 4) There was an unpredictable relationship.
- 3 Which value of r represents data with a strong positive linear correlation between two variables?
 - 1) 0.89
 - 2) 0.34
 - 3) 1.04
 - 4) 0.01
- 4 Which value of r represents data with a strong negative linear correlation between two variables?
 - 1) -1.07
 - 2) -0.89
 - 3) -0.14
 - 4) 0.92
- 5 Which calculator output shows the strongest linear relationship between x and y ?

Lin Reg
 $y = a + bx$
 $a = 59.026$
 $b = 6.767$

 - 1) $r = .8643$

Lin Reg
 $y = a + bx$
 $a = .7$
 $b = 24.2$
 - 2) $r = .8361$

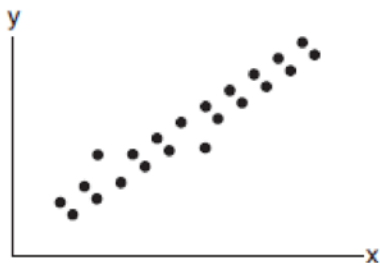
Lin Reg
 $y = a + bx$
 $a = 2.45$
 $b = .95$
 - 3) $r = .6022$

Lin Reg
 $y = a + bx$
 $a = -2.9$
 $b = 24.1$
 - 4) $r = -.8924$

- 6 The points in the scatter plot below represent the ages of automobiles and their values. Based on this scatter plot, it would be reasonable to conclude:

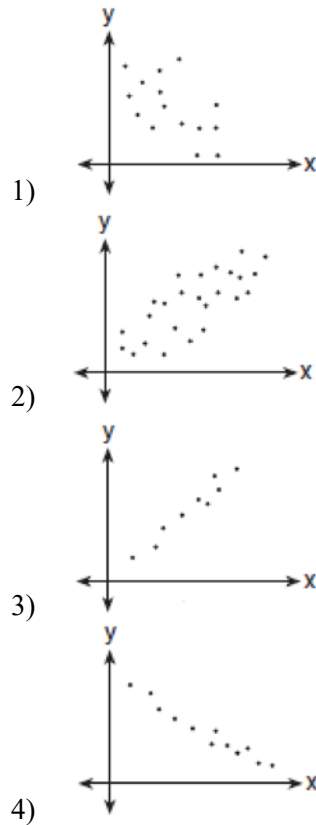


- 1) Age and value have a coefficient of correlation that is less than zero.
 - 2) Age and value have a coefficient of correlation that is equal to zero.
 - 3) Age and value have a coefficient of correlation that is between zero and 0.5.
 - 4) Age and value have a coefficient of correlation that is greater than 0.5.
- 7 What could be the approximate value of the correlation coefficient for the accompanying scatter plot?

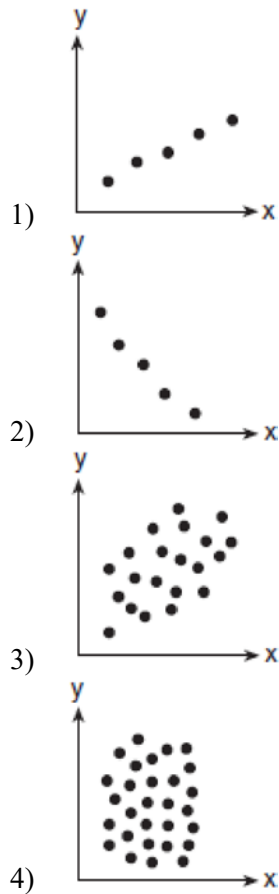


- 1) -0.85
- 2) -0.16
- 3) 0.21
- 4) 0.90

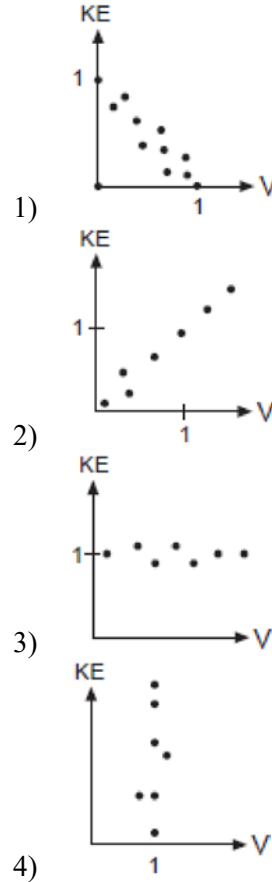
- 8 Which graph represents data used in a linear regression that produces a correlation coefficient closest to -1 ?



- 9 Which scatter diagram shows the strongest positive correlation?



- 10 In the physics lab, Thelma determined the kinetic energy, KE , of an object at various velocities, V , and found the linear correlation coefficient between KE and V to be $+0.8$. Which graph shows this relationship?



- 11 The relationship between t , a student's test scores, and d , the student's success in college, is modeled by the equation $d = 0.48t + 75.2$. Based on this linear regression model, the correlation coefficient could be
- 1) between -1 and 0
 - 2) between 0 and 1
 - 3) equal to -1
 - 4) equal to 0

- 12 A linear regression equation of best fit between a student's attendance and the degree of success in school is $h = 0.5x + 68.5$. The correlation coefficient, r , for these data would be
- 1) $0 < r < 1$
 - 2) $-1 < r < 0$
 - 3) $r = 0$
 - 4) $r = -1$
- 13 The relationship of a woman's shoe size and length of a woman's foot, in inches, is given in the accompanying table.

Woman's Shoe Size	5	6	7	8
Foot Length (in)	9.00	9.25	9.50	9.75

The linear correlation coefficient for this relationship is

- 1) 1
- 2) -1
- 3) 0.5
- 4) 0

- 14 As shown in the table below, a person's target heart rate during exercise changes as the person gets older.

Age (years)	Target Heart Rate (beats per minute)
20	135
25	132
30	129
35	125
40	122
45	119
50	115

Which value represents the linear correlation coefficient, rounded to the *nearest thousandth*, between a person's age, in years, and that person's target heart rate, in beats per minute?

- 1) -0.999
- 2) -0.664
- 3) 0.998
- 4) 1.503

- 15 Determine which set of data given below has the stronger linear relationship between x and y . Justify your choice.

Set A

x	1	2	3	4	5	6
y	24	30	36	51	70	86

Set B

x	1	2	3	4	5	6
y	81	64	49	36	25	16

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Answer Section

1 ANS: 3 REF: 011616a2

2 ANS: 2 REF: 081502a2

3 ANS: 1 REF: 061316a2

4 ANS: 2 REF: 061021a2

5 ANS: 1

(4) shows the strongest linear relationship, but if $r < 0$, $b < 0$. The Regents announced that a correct solution was not provided for this question and all students should be awarded credit.

REF: 011223a2

6 ANS: 1 REF: fall9910b

7 ANS: 4 REF: 060705b

8 ANS: 4 REF: 080306b

9 ANS: 1 REF: 010515b

10 ANS: 2 REF: 010816b

11 ANS: 2

Since the coefficient of t is greater than 0, $r > 0$.

REF: 011303a2

12 ANS: 1 REF: 060211b

13 ANS: 1 REF: 060109b

14 ANS: 1

L1	L2	L3	3
20	125		
25	135		
30	125		
35	125		
40	125		
45	115		
50	115		
L3(1)=			

LinReg
y=ax+b
a=-.6642857143
b=148.5357143
r ² =.9982686981
r=-.999133974

REF: 061225a2

15 ANS:

$r_A \approx 0.976$ $r_B \approx 0.994$ Set B has the stronger linear relationship since r is higher.

REF: 061535a2