

## CHAPTER 11-3

### CORRELATION COEFFICIENT

1. 060211b, P.I. A2.S.8

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

- [A]  $r = 0$                       [B]  $-1 < r < 0$   
[C]  $0 < r < 1$                 [D]  $r = -1$

2. 060109b, P.I. A2.S.8

The relationship of a woman's shoe size and length of a woman's foot, in inches, is given in the accompanying table.

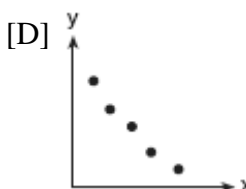
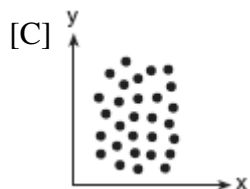
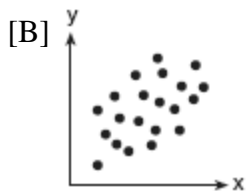
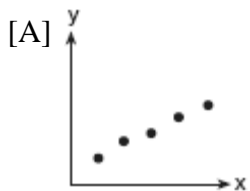
Woman's Shoe Size	5	6	7	8
Foot Length (in)	9.00	9.25	9.50	9.75

The linear correlation coefficient for this relationship is

- [A] -1      [B] 1      [C] 0      [D] 0.5

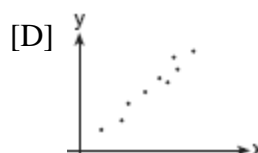
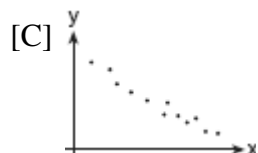
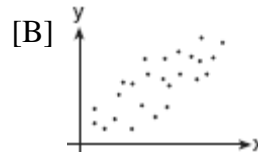
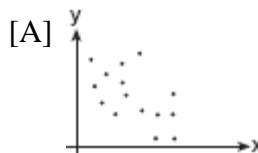
3. 010515b, P.I. A2.S.8

Which scatter diagram shows the strongest positive correlation?



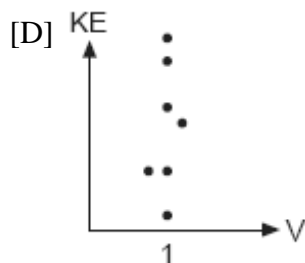
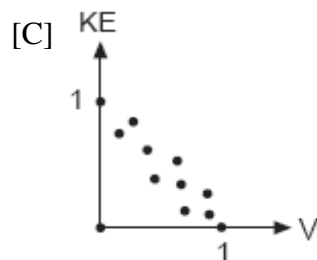
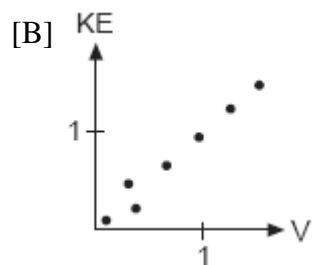
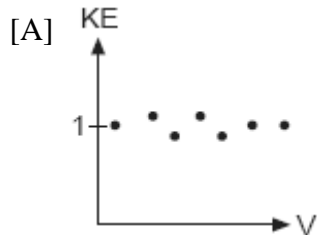
4. 080306b, P.I. A2.S.8

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



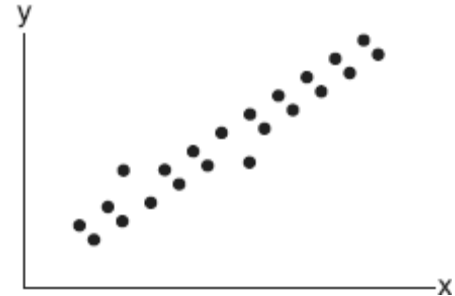
5. 010816b, P.I. A2.S.8

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?



6. 060705b, P.I. A2.S.8

What could be the approximate value of the correlation coefficient for the accompanying scatter plot?



[A] 0.90 [B] -0.85 [C] -0.16 [D] 0.21

## CHAPTER 11-4

### STANDARD DEVIATION

7. 010604b

On a standardized test, a score of 86 falls exactly 1.5 standard deviations below the mean. If the standard deviation for the test is 2, what is the mean score for this test?

[A] 89 [B] 84.5 [C] 84 [D] 87.5

8. 060221b

On a nationwide examination, the Adams School had a mean score of 875 and a standard deviation of 12. The Boswell School had a mean score of 855 and a standard deviation of 20. In which school was there greater consistency in the scores? Explain how you arrived at your answer.

9. 010707b, P.I. A2.S.4

The term “snowstorms of note” applies to all snowfalls over 6 inches. The snowfall amounts for snowstorms of note in Utica, New York, over a four-year period are as follows: 7.1, 9.2, 8.0, 6.1, 14.4, 8.5, 6.1, 6.8, 7.7, 21.5, 6.7, 9.0, 8.4, 7.0, 11.5, 14.1, 9.5, 8.6. What are the mean and population standard deviation for these data, to the *nearest hundredth*?

[A] mean = 9.45; standard deviation = 3.74

[B] mean = 9.46; standard deviation = 3.85

[C] mean = 9.45; standard deviation = 3.85

[D] mean = 9.46; standard deviation = 3.74

10. 060630b, P.I. A2.S.4

The number of children of each of the first 41 United States presidents is given in the accompanying table. For this population, determine the mean and the standard deviation to the *nearest tenth*. How many of these presidents fall within one standard deviation of the mean?

Number of Children ( $x_i$ )	Number of Presidents ( $f_i$ )
0	6
1	2
2	8
3	6
4	7
5	3
6	5
7	1
8	1
10	1
15	1

11. 060729b, P.I. A2.S.4

Conant High School has 17 students on its championship bowling team. Each student bowled one game. The scores are listed in the accompanying table.

Score ( $x_i$ )	Frequency ( $f_i$ )
140	4
145	3
150	2
160	3
170	2
180	2
194	1

Find, to the *nearest tenth*, the population standard deviation of these scores. How many of the scores fall within one standard deviation of the mean?

12. 080730b, P.I. A2.S.4

Mr. Koziol has 17 students in his high school golf club. Each student played one round of golf. The summarized scores of the students are listed in the accompanying table.

Score	Frequency
70	4
73	3
75	2
80	3
85	1
86	1
90	2
92	1

Find the population standard deviation of this set of students' scores, to the *nearest tenth*. How many of the individual students' golf scores fall within one population standard deviation of the mean?

13. 080625b, P.I. A2.S.4  
Beth's scores on the six Earth science tests she took this semester are 100, 95, 55, 85, 75, and 100. For this population, how many scores are within one standard deviation of the mean?
14. 010529b, P.I. A2.S.4  
From 1984 to 1995, the winning scores for a golf tournament were 276, 279, 279, 277, 278, 278, 280, 282, 285, 272, 279, and 278. Using the standard deviation for the sample,  $S_x$ , find the percent of these winning scores that fall within one standard deviation of the mean.
15. 060227b, P.I. A2.S.4  
An electronics company produces a headphone set that can be adjusted to accommodate different-sized heads. Research into the distance between the top of people's heads and the top of their ears produced the following data, in inches: 4.5, 4.8, 6.2, 5.5, 5.6, 5.4, 5.8, 6.0, 5.8, 6.2, 4.6, 5.0, 5.4, 5.8. The company decides to design their headphones to accommodate three standard deviations from the mean. Find, to the *nearest tenth*, the mean, the standard deviation, and the range of distances that must be accommodated.
16. 010406b, P.I. A2.S.4  
Jean's scores on five mathematics tests were 98, 97, 99, 98, and 96. Her scores on five English tests were 78, 84, 95, 72, and 79. Which statement is true about the standard deviations for the scores?
- [A] The standard deviation for the English scores is greater than the standard deviation for the math scores.
- [B] The standard deviations for both sets of scores are equal.
- [C] More information is needed to determine the relationship between the standard deviations.
- [D] The standard deviation for the math scores is greater than the standard deviation for the English scores.

## CHAPTER 11-7

### NORMAL DISTRIBUTIONS

17. 010308b, P.I. A2.S.5  
The national mean for verbal scores on an exam was 428 and the standard deviation was 113. Approximately what percent of those taking this test had verbal scores between 315 and 541?
- [A] 38.2%                      [B] 26.4%
- [C] 68.2%                      [D] 52.8%
18. 080202b, P.I. A2.S.5  
In a New York City high school, a survey revealed the mean amount of cola consumed each week was 12 bottles and the standard deviation was 2.8 bottles. Assuming the survey represents a normal distribution, how many bottles of cola per week will approximately 68.2% of the students drink?
- [A] 12 to 20.4                      [B] 6.4 to 12
- [C] 6.4 to 17.6                      [D] 9.2 to 14.8

19. 060412b, P.I. A2.S.5  
The amount of juice dispensed from a machine is normally distributed with a mean of 10.50 ounces and a standard deviation of 0.75 ounce. Which interval represents the amount of juice dispensed about 68.2% of the time?  
[A] 9.00-12.00 [B] 9.75-10.50  
[C] 9.75-11.25 [D] 10.50-11.25
20. 080129b, P.I. A2.S.5  
Twenty high school students took an examination and received the following scores: 70, 60, 75, 68, 85, 86, 78, 72, 82, 88, 88, 73, 74, 79, 86, 82, 90, 92, 93, 73. Determine what percent of the students scored within one standard deviation of the mean. Do the results of the examination approximate a normal distribution? Justify your answer.
21. 060432b, P.I. A2.S.5  
Mrs. Ramírez is a real estate broker. Last month, the sale prices of homes in her area approximated a normal distribution with a mean of \$150,000 and a standard deviation of \$25,000. A house had a sale price of \$175,000. What is the percentile rank of its sale price, to the *nearest whole number*? Explain what that percentile means. Mrs. Ramírez told a customer that most of the houses sold last month had selling prices between \$125,000 and \$175,000. Explain why she is correct.
22. 080405b, P.I. A2.S.5  
The mean of a normally distributed set of data is 56, and the standard deviation is 5. In which interval do approximately 95.4% of all cases lie?  
[A] 46-56 [B] 51-61  
[C] 56-71 [D] 46-66
23. 010411b, P.I. A2.S.5  
Battery lifetime is normally distributed for large samples. The mean lifetime is 500 days and the standard deviation is 61 days. Approximately what percent of batteries have lifetimes *longer than* 561 days?  
[A] 34% [B] 84% [C] 16% [D] 68%
24. 080317b, P.I. A2.S.5  
The amount of ketchup dispensed from a machine at Hamburger Palace is normally distributed with a mean of 0.9 ounce and a standard deviation of 0.1 ounce. If the machine is used 500 times, approximately how many times will it be expected to dispense 1 or more ounces of ketchup?  
[A] 100 [B] 5 [C] 80 [D] 16
25. 060126b, P.I. A2.S.5  
Professor Bartrich has 184 students in her mathematics class. The scores on the final examination are normally distributed and have a mean of 72.3 and a standard deviation of 8.9. How many students in the class can be expected to receive a score between 82 and 90?
26. 010809b, P.I. A2.S.5  
On a standardized test with a normal distribution, the mean was 64.3 and the standard deviation was 5.4. What is the best approximation of the percent of scores that fell between 61.6 and 75.1?  
[A] 38.2% [B] 95%  
[C] 68.2% [D] 66.8%

27. 060206b, P.I. A2.S.5  
On a standardized test, the distribution of scores is normal, the mean of the scores is 75, and the standard deviation is 5.8. If a student scored 83, the student's score ranks
- [A] above the 97th percentile  
[B] between the 75th percentile and the 84th percentile  
[C] between the 84th percentile and the 97th percentile  
[D] below the 75th percentile
28. 080515b, P.I. A2.S.5  
The mean score on a normally distributed exam is 42 with a standard deviation of 12.1. Which score would be expected to occur less than 5% of the time?
- [A] 32      [B] 67      [C] 60      [D] 25
29. 060324b, P.I. A2.S.5  
In a certain school district, the ages of all new teachers hired during the last 5 years are normally distributed. Within this curve, 95.4% of the ages, centered about the mean, are between 24.6 and 37.4 years. Find the mean age and the standard deviation of the data.
30. 010226b, P.I. A2.S.5  
A set of normally distributed student test scores has a mean of 80 and a standard deviation of 4. Determine the probability that a randomly selected score will be between 74 and 82.
31. 080222b, P.I. A2.S.5  
The amount of time that a teenager plays video games in any given week is normally distributed. If a teenager plays video games an average of 15 hours per week, with a standard deviation of 3 hours, what is the probability of a teenager playing video games between 15 and 18 hours a week?
32. 010327b, P.I. A2.S.5  
A shoe manufacturer collected data regarding men's shoe sizes and found that the distribution of sizes exactly fits the normal curve. If the mean shoe size is 11 and the standard deviation is 1.5, find:  
*a* the probability that a man's shoe size is greater than or equal to 11  
*b* the probability that a man's shoe size is greater than or equal to 12.5  
*c*  $\frac{P(\text{size} \geq 12.5)}{P(\text{size} \geq 8)}$

### **NORMAL PROBABILITY**

30. 010226b, P.I. A2.S.5  
A set of normally distributed student test scores has a mean of 80 and a standard deviation of 4. Determine the probability that a randomly selected score will be between 74 and 82.
31. 080222b, P.I. A2.S.5  
The amount of time that a teenager plays video games in any given week is normally distributed. If a teenager plays video games an average of 15 hours per week, with a standard deviation of 3 hours, what is the probability of a teenager playing video games between 15 and 18 hours a week?

[1] C

[2] B

[3] A

[4] C

[5] B

[6] A

[7] A

[2] The Adams School, and an appropriate explanation is given, such as the standard deviation is a measure of dispersion, which is how much the scores, on the average, differ from the mean. Therefore, the school with the smaller standard deviation would have the more consistent scores.

[1] The Adams School, but an incomplete explanation is given, or the school is not stated, but an appropriate explanation is given.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[8] incorrect procedure.

[9] D

[4] Mean = 3.6, standard deviation = 2.9, and 31, and appropriate work is shown, such as an explanation of how the solutions were found.

[3] Appropriate work is shown, but one computational or rounding error is made.

or [3] The mean and standard deviation are calculated correctly and appropriate work is shown, but the number of presidents in the specified interval is found incorrectly.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] Appropriate work is shown, but one conceptual error is made, such as using the sample standard deviation.

or [2] The mean and standard deviation are calculated correctly, but the number of presidents is not found.

or [2] The mean and standard deviation are calculated incorrectly, but an appropriate number of presidents is found.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [1] Mean = 3.6, standard deviation = 2.9, and 31, but no work is shown.

[0] Mean = 3.6 or standard deviation = 2.9 or 31, but no work is shown.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[10] obviously incorrect procedure.

[4] 16.2 and 10, and appropriate work is shown.

[3] Appropriate work is shown, but one computational or rounding error is made.

or [3] Appropriate work is shown, but the sample standard deviation(s) is used, resulting in answers of 16.7 and 10.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [1] 16.2 and 10, but no work is shown.

[0] 16.2 or 10, but no work is shown.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[11] obviously incorrect procedure.

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[4] 7.5 and 9, and appropriate work is shown.

[3] Appropriate work is shown, but one computational or rounding error is made.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] Appropriate work is shown, but one conceptual error is made, such as using 7.7, the sample standard deviation.

or [2] The population standard deviation and mean are found correctly, but no further correct work is shown.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [1] 7.5 and 9, but no work is shown.

[0] 7.5 or 9, but no work is shown.

or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an

[12] obviously incorrect procedure.

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[2] 5, and appropriate work is shown, such as stating the mean and the standard deviation.

[1] Appropriate work is shown, but one computational error is made, but an

appropriate number of scores is found.

or [1] Appropriate work is shown, but one conceptual error is made, such as using the sample standard deviation.

or [1] The mean and standard deviation are found correctly, but the number of scores is missing or is incorrect.

or [1] 5, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[13] incorrect procedure.

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[4] 75, and appropriate work is shown, such as determining the mean (278.5833333) and the standard deviation for the sample (3.146667309).

[3] Appropriate work is shown, but one computational or rounding error is made.

or [3] Appropriate work is shown, but the standard deviation for the population ( $\sigma$ ) is used.

or [3] The mean, standard deviation for the sample, and interval are determined correctly, but an error is made in determining the percentage.

or [3] The mean and standard deviation for the sample are determined correctly, but an appropriate percentage is determined for an incorrect interval.

[2] Appropriate work is shown, but two or more computational or rounding errors are made.

or [2] Appropriate work is shown, but one conceptual error is made.

or [2] The mean and standard deviation for the sample are determined correctly, but no further correct work is shown.

or [2] Either the mean or the standard deviation for the sample is determined incorrectly, but an appropriate percentage is found.

[1] Appropriate work is shown, but one conceptual error and one computational or rounding error are made.

or [1] The standard deviation for the sample is determined correctly, but no further correct work is shown.

or [1] 75, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[14] incorrect procedure.

[4]  $\bar{x} = 5.5$ ,  $\sigma = 0.5$ , and the range is 4-7, and appropriate work is shown.

[3]  $\bar{x} = 5.5$ ,  $\sigma = 0.5$ , but one computational error is made when finding the range, but appropriate work is shown.

or [3]  $\bar{x}$  is correct, but  $\sigma$  is incorrect, but the range is appropriate, based on the incorrect  $\sigma$ .

or [3]  $\bar{x}$  is incorrect, but  $\sigma$  and the range are appropriate, based on the incorrect  $\bar{x}$ .

[2]  $\bar{x}$  is incorrect and  $\sigma$  is incorrect, but the range is appropriate, based on the incorrect  $\bar{x}$  and  $\sigma$ .

or [2]  $\bar{x}$  is correct and  $\sigma$  is correct, but the range is not determined.

[1]  $\bar{x} = 5.5$ ,  $\sigma = 0.5$ , and the range is 4-7, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[15] incorrect procedure.

[16] A

[17] C

[18] D

[19] C

- [4] 8.7 standard deviation, 70% within one standard deviation, and “Yes,” and appropriate work is shown, and an appropriate justification is given.  
or [4] 8.7 standard deviation, 70% within one standard deviation, and “No,” and appropriate work is shown, and an appropriate justification is given.  
[3] One error is made in determining the standard deviation or the percent, but all the other work is appropriate.  
[2] 8.7 and 70%, and appropriate work is shown, but no justification is given.  
or [2] The standard deviation is determined correctly, but more than one error is made when calculating the percent, but the justification is appropriate.  
[1] The standard deviation is determined correctly, but no further work is shown.  
or [1] The standard deviation is determined incorrectly, but the percent is appropriate, based on the incorrect standard deviation.  
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- [20] \_\_\_\_\_

- [4] 84, and appropriate work is shown, and correct explanations are written.  
[3] Appropriate work is shown, but one computational or rounding error is made, but both explanations are correct.  
or [3] 84, but only one of the explanations is correct.  
[2] 84, but both explanations are only partially correct.  
[1] 84, but both explanations are missing or are incorrect.  
or [1] One correct explanation is written, but no further correct work is shown.  
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- [21] \_\_\_\_\_

[22] D

[23] C

[24] C

- [2] 25, and appropriate work is shown.  
[1] Appropriate work is shown, but one computational or rounding error is made.  
or [1] The solution is incomplete, such as only the correct percent is shown.  
or [1] 25, but no work is shown.  
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- [25] \_\_\_\_\_

[26] D

[27] C

[28] B

- [2] Mean = 31 and standard deviation = 3.2, and appropriate work is shown.  
[1] Appropriate work is shown, but one computational error is made.  
or [1] Either the mean or the standard deviation is determined correctly, and appropriate work is shown.  
or [1] Mean = 31 and standard deviation = 3.2, but no work is shown.  
[0] Mean = 31 or standard deviation = 3.2, but no work is shown.  
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- [29] \_\_\_\_\_

- [2] 0.624 or 62.4%, and appropriate work is shown.  
[1] The correct standard deviations of -1.5 and +0.5 are found, but an incorrect probability is calculated.  
or [1] Appropriate work is shown, but one computational error is made.  
or [1] 0.624 or 62.4%, but no work is shown.  
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- [30] \_\_\_\_\_

[2] 0.341 or 34.1% or an equivalent answer, and appropriate work is shown.

[1] 0.682 or 0.841 or some other probability related to one standard deviation from the mean is shown.

or [1] 0.341 or 34.1% or an equivalent answer, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[31] incorrect procedure.

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[4]  $\frac{1}{2}$  or 50%,  $\frac{15.9}{100}$  or 0.159, and  $\frac{0.159}{0.977}$  or

an equivalent answer, and appropriate work is shown.

[3] Correct answers are found for either part a or part b and for part c.

[2] Correct answers are found for part a and part b, but the answer for part c is missing or is incorrect.

or [2] Only the correct answer for part b is found, and one computational or substitution error is made in determining the answer to part c.

[1] Only the correct answer for either part a or part b is found.

or [1]  $\frac{1}{2}$  or 50%,  $\frac{15.9}{100}$  or 0.159, and  $\frac{0.159}{0.977}$

or an equivalent answer, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

[32] incorrect procedure.

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