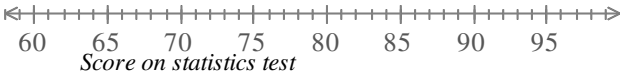
ALEKS® Objective 2 Worksheet

Introduction to Statistics / Math 117 Statistics (Mr. Banimahd)

1. The following data are the grades of 18 students on a statistics test.

94, 80, 66, 90, 74, 96, 76, 92, 66, 91, 61, 93, 83, 95, 89, 73, 97, 89.

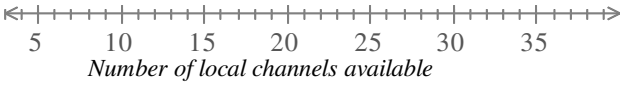
Construct a box-and-whisker plot for the data.



2. The following data are the numbers of local channels available in 17 cities.

18, 33, 9, 27, 11, 15, 22, 30, 20, 23, 37, 18, 39, 35, 35, 34, 38.

Construct a box-and-whisker plot for the data.

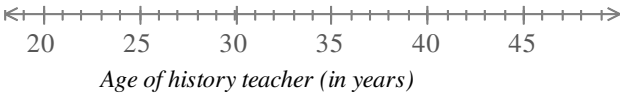


Number of local channels available

3. The following data are the ages (in years) of 19 history teachers in a school district.

48, 23, 45, 44, 36, 47, 38, 28, 36, 39, 35, 40, 25, 29, 30, 32, 41, 31, 50.

Construct a box-and-whisker plot for the data.



Age of history teacher (in years)

4. Several years ago, the state of California launched an aggressive advertisement campaign against smoking. We've interviewed students from 16 college campuses in California and recorded for each campus the percentage of students who claimed that they had encountered at least one anti-smoking advertisement on campus in the past month. Here are those percentages:

51, 57, 56, 50, 60, 42, 54, 47, 34, 32, 50, 40, 36, 54, 33, 44.

Construct a box-and-whisker plot for the data.

Percentage encountering anti-smoking ad

5. Each year, taxpayers are able to contribute money to various charities via their IRS tax forms. The following list contains the amounts of money (in dollars) donated via IRS tax forms by 9 taxpayers:

95, 95, 90, 86, 33, 51, 94, 21, 95.

(a) What is the mean of this data set? If your answer is not an integer, round your answer to at least one decimal place.

(b) What is the median of this data set? If your answer is not an integer, round your answer to at least one decimal place.

(c) How many modes does the data set have, and what are their values? Indicate the number of modes by selecting the appropriate line, and then indicate the value(s) of the mode(s), if applicable.

1. zero modes
2. one mode: _____
3. two modes: _____ _____

6. To begin to better understand personal experiences of headache pain, a drug manufacturer has asked 8 adults to rate their most recent headache on a scale of 0 to 100 (with 0 corresponding to no pain and 100 corresponding to the greatest pain the person has ever felt). Here are the 8 ratings:

29, 61, 57, 36, 54, 55, 36, 36.

(a) What is the median of this data set? If your answer is not an integer, round your answer to at least one decimal place.

(b) What is the mean of this data set? If your answer is not an integer, round your answer to at least one decimal place.

(c) How many modes does the data set have, and what are their values? Indicate the number of modes by selecting the appropriate line, and then indicate the value(s) of the mode(s), if applicable.

1. zero modes
2. one mode: _____
3. two modes: _____ _____

7. On each trial of an experiment, a participant is presented with a constant soft noise, which is interrupted at some unpredictable time by a slightly louder sound. The time it takes for the participant to react to the louder sound is recorded. The following list contains the reaction times (in milliseconds) for 9 trials of this experiment:

321, 443, 755, 342, 586, 617, 443, 415, 626.

(a) What is the mean of this data set? If your answer is not an integer, round your answer to at least one decimal place.

(b) What is the median of this data set? If your answer is not an integer, round your answer to at least one decimal place.

(c) How many modes does the data set have, and what are their values? Indicate the number of modes by selecting the appropriate line, and then indicate the value(s) of the mode(s), if applicable.

1. zero modes
2. one mode: _____
3. two modes: _____ _____

8. Customers waiting at Ellerton Bank have been complaining about the amount of time they must wait in line. Managers at the bank, beginning to investigate the problem, have recorded sample waiting times for 8 customers at the bank. Here are the 8 waiting times (in minutes):

16, 21, 25, 19, 22, 24, 15, 25.

(a) What is the median of this data set? If your answer is not an integer, round your answer to at least one decimal place.

(b) What is the mean of this data set? If your answer is not an integer, round your answer to at least one decimal place.

(c) How many modes does the data set have, and what are their values? Indicate the number of modes by selecting the appropriate line, and then indicate the value(s) of the mode(s), if applicable.

1. zero modes
2. one mode: _____
3. two modes: _____ _____

9. An investment company advertised that last year its clients, on average, made a profit of 9%. Assuming that *average* refers to the mean, which of the following claims must be true based on this information?

Note: More than one statement could be true. If none of the statements is true, mark the appropriate box.

☐	Last year, the number of their clients who made a profit of less than 9% was equal to the number of their clients who made a profit of more than 9%.
☐	Two years ago some of their clients made a profit of at least 9%.
☐	Last year at least one of their clients made a profit of exactly 9%.
☐	Last year at least one of their clients made a profit of more than 3%.
☐	Last year all of their clients made a profit of 9% or more.
☐	None of the above statements is true.

10. A private college advertised that last year their freshman students, on average, had a score of 1200 on the college entrance exam. Assuming that *average* refers to the mean, which of the following claims must be true based on this information?

Note: More than one statement could be true. If none of the statements is true, mark the appropriate box.

☐	Last year at least one of their freshman students had a score of less than 1400 on the exam.
☐	Last year, the number of their freshman students who had a score of 1200 or below on the exam was equal to the number of their freshman students who had a score of 1200 or above on the exam.
☐	Next year at least one of their freshman students will have a score of at least 1200 on the exam.
☐	Last year some of their freshman students had a score of exactly 1200 on the exam.
☐	Last year all of their freshman students had a score of at least 1200 on the exam.
☐	None of the above statements is true.

11. A job placement agency advertised that last year its clients, on average, had a starting salary of $\$39{,}000$. Assuming that *average* refers to the mean, which of the following claims must be true based on this information?

Note: More than one statement could be true. If none of the statements is true, mark the appropriate box.

☐	Last year, the number of their clients who had a starting salary of $\$39{,}000$ or below was equal to the number of their clients who had a starting salary of $\$39{,}000$ or above.
☐	Two years ago some of their clients had a starting salary of at least $\$39{,}000$.
☐	Last year at least one of their clients had a starting salary of exactly $\$39{,}000$.
☐	Last year all of their clients had a starting salary of less than $\$43{,}000$.
☐	Last year at least one of their clients had a starting salary of $\$39{,}000$ or above.
☐	None of the above statements is true.

12. An investment company advertised that last year its clients, on average, made a profit of 9%. Assuming that *average* refers to the mean, which of the following claims must be true based on this information?

Note: More than one statement could be true. If none of the statements is true, mark the appropriate box.

☐	Last year fewer than half of their clients made a profit of 9% or less.
☐	Last year at least one of their clients made a profit of exactly 9%.
☐	Last year at least one of their clients made a profit of more than 13%.
☐	This year some of their clients will make a profit of at least 9%.
☐	Last year some of their clients made a profit of 9% or more.
☐	None of the above statements is true.

13. The scores on a test for a sample of 41 statistics students are summarized in the following table.

Number of students	Score
10	90
18	80
13	70

Find the mean score. Round your answer to at least one decimal place.

14. The hourly wages of a sample of 34 employees of a computer company are summarized in the table below:

Number of employees	Hourly wage (in dollars)
7	6.00
13	8.50
14	10.50

Find the mean hourly wage of these 34 employees. Round your answer to at least two decimal places.

15. A sample of 39 customers was taken at a local computer store. The customers were asked the prices of the computers they had bought. The data are summarized in the following table.

Number of computers	Price (in dollars)
14	2300
10	1600
15	2150

Find the mean price for this sample. Round your answer to the nearest dollar.

16. The following summarizes the number of fiction books read last summer by a sample of 26 students at a certain college.

Number of students	Number of books
6	2
8	3
12	4

What is the mean number of books read? Round your answer to at least one decimal place.

17. The ages (in years) of the 6 employees at a particular computer store are

39, 31, 43, 38, 22, 25.

Assuming that these ages constitute an entire population, find the standard deviation of the population. Round your answer to at least two decimal places.

18. All 6 members of a family work. Their hourly wages (in dollars) are

15, 17, 32, 29, 18, 9.

Assuming that these wages constitute an entire population, find the standard deviation of the population. Round your answer to at least two decimal places.

19. The following data are the distances from the workplace (in miles) for the 5 employees of a small business:

6, 9, 5, 19, 1.

Assuming that these distances constitute an entire population, find the standard deviation of the population. Round your answer to at least two decimal places.

20. The 6 participants in a 200-meter dash had the following finishing times (in seconds):

28, 31, 25, 24, 28, 26.

Assuming that these times constitute an entire population, find the standard deviation of the population. Round your answer to at least two decimal places.

21. The following are distances (in miles) traveled to the workplace by 6 employees of a certain hospital.

25, 18, 14, 31, 11, 9.

Find the standard deviation of this sample of distances. Round your answer to at least two decimal places.

22. The tourist bureau of the Hawaiian Islands surveyed a sample of 5 United States tourists as they left to return home. The tourists were asked how many days they spent on their visits. Their responses were as follows:

9, 11, 12, 6, 7.

Find the standard deviation of this sample of numbers. Round your answer to at least two decimal places.

23. The red blood cell counts (in 10^5 cells per microliter) of a healthy adult measured on 5 days are as follows:

54, 55, 48, 50, 53.

Find the standard deviation of this sample of counts. Round your answer to at least two decimal places.

24. Below are the times (in days) it takes for a sample of 5 customers from Andrew's computer store to pay their invoices.

32, 29, 42, 39, 33.

Find the standard deviation of this sample of times. Round your answer to at least two decimal places.

25. Loretta, who turns eighty this year, has just learned about blood pressure problems in the elderly and is interested in how her blood pressure compares to those of her peers. Specifically, she is interested in her systolic blood pressure, which can be problematic among the elderly. She has uncovered an article in a scientific journal that reports that the mean systolic blood pressure measurement for women over seventy-five is 132.5 mmHg, with a standard deviation of 6.9 mmHg.

Assume that the article reported correct information. Complete the following statements about the distribution of systolic blood pressure measurements for women over seventy-five.

(a) According to Chebyshev's theorem, at least 84% of the measurements lie between _____mmHg and _____mmHg. (Round your answer to 1 decimal place.)

(b) According to Chebyshev's theorem, at least _____% of the measurements lie between 118.7 mmHg and 146.3 mmHg.
a. 56% b. 75% c. 84% d. 89%

(c) Suppose that the distribution is bell-shaped. According to the empirical rule, approximately _____% of the measurements lie between 118.7 mmHg and 146.3 mmHg.
a. 68% b. 75% c. 95% d. 99.7%

(d) Suppose that the distribution is bell-shaped. According to the empirical rule, approximately 68% of the measurements lie between _____mmHg and _____mmHg.

26. There is some evidence that, in the years $1981 - 85$, a simple name change resulted in a short-term increase in the price of certain business firms' stocks (relative to the prices of similar stocks). (See D. Horsky and P. Swyngedouw, "Does it pay to change your company's name? A stock market perspective," Marketing Science v.6, pp. $320 - 35, 1987$.)

Suppose that, to test the profitability of name changes in the more recent market (the past five years), we analyze the stock prices of a large sample of corporations shortly after they changed names, and we find that the mean relative increase in stock price was about 0.75%, with a standard deviation of 0.16%. Suppose that this mean and standard deviation apply to the population of all companies that changed names during the past five years. Complete the following statements about the distribution of relative increases in stock price for all companies that changed names during the past five years.

(a) According to Chebyshev's theorem, at least _____% of the relative increases in stock price lie between 0.43 % and 1.07 %.
a. 56% b. 75% c. 84% d. 89%

(b) According to Chebyshev's theorem, at least 8/9 (about 89%) of the relative increases in stock price lie between _____% and _____%. (Round your answer to 2 decimal places.)

(c) Suppose that the distribution is bell-shaped. According to the empirical rule, approximately 68% of the relative increases in stock price lie between _____% and _____%.

(d) Suppose that the distribution is bell-shaped. According to the empirical rule, approximately _____% of the relative increases in stock price lie between 0.43 % and 1.07 %.
a. 68% b. 75% c. 95% d. 99.7%

27. A major cab company in Chicago has computed its mean fare from O'Hare Airport to the Drake Hotel to be $\$28.01$, with a standard deviation of $\$4.11$. Based on this information, complete the following statements about the distribution of the company's fares from O'Hare Airport to the Drake Hotel.

(a) According to Chebyshev's theorem, at least _____% of the fares lie between 19.79 dollars and 36.23 dollars.
a. 56% b. 75% c. 84% d. 89%

(b) According to Chebyshev's theorem, at least 36% of the fares lie between _____dollars and _____dollars. (Round your answer to 2 decimal places.)

(c) Suppose that the distribution is bell-shaped. According to the empirical rule, approximately 68% of the fares lie between _____dollars and _____dollars.

(d) Suppose that the distribution is bell-shaped. According to the empirical rule, approximately _____% of the fares lie between 19.79 dollars and 36.23 dollars.
a. 68% b. 75% c. 95% d. 99.7%

28. Students at a major university are complaining of a serious housing crunch. Many of the university's students, they complain, have to commute too far to school because there is not enough housing near campus. The university officials respond with the following information: the mean distance commuted to school by students is 16.3 miles, and the standard deviation of the distance commuted is 3.1 miles.

Assuming that the university officials' information is correct, complete the following statements about the distribution of commute distances for students at this university.

(a) According to Chebyshev's theorem, at least _____% of the commute distances lie between 10.1 miles and 22.5 miles.
a. 56% b. 75% c. 84% d. 89%

(b) According to Chebyshev's theorem, at least _____% of the commute distances lie between 11.65 miles and 20.95 miles.
a. 56% b. 75% c. 84% d. 89%

(c) Suppose that the distribution is bell-shaped. According to the empirical rule, approximately _____% of the commute distances lie between 10.1 miles and 22.5 miles.
a. 68% b. 75% c. 95% d. 99.7%

(d) Suppose that the distribution is bell-shaped. According to the empirical rule, approximately 68% of the commute distances lie between _____miles and _____miles.

29. Each year, taxpayers are able to contribute money to various charities via their IRS tax forms. The following list contains the amounts of money (in dollars) donated via IRS tax forms by 24 taxpayers:

19, 24, 34, 37, 37, 44, 57, 58, 59, 66, 70, 76, 78, 78, 78, 83, 88, 96, 107, 114, 130, 149, 173, 186.

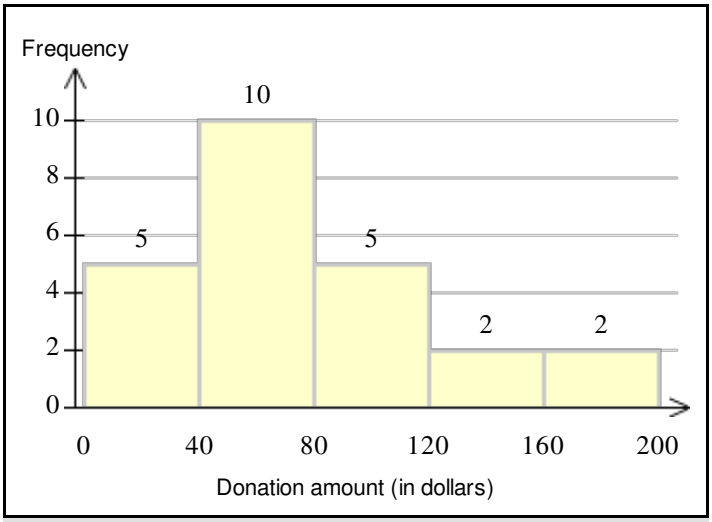


Figure 1

(a) Which measures of central tendency do not exist for this data set? Choose all that apply.

1. Mean
2. Median
3. Mode
4. None of these measures

(b) Suppose that the measurement 186 (the largest measurement in the data set) were replaced by 244. Which measures of central tendency would be affected by the change? Choose all that apply.

1. Mean
2. Median
3. Mode
4. None of these measures

(c) Suppose that, starting with the original data set, the largest measurement were removed. Which measures of central tendency would be changed from those of the original data set? Choose all that apply.

1. Mean
2. Median
3. Mode
4. None of these measures

(d) Which of the following best describes the distribution of the original data? Choose only one.

1. Negatively skewed
2. Positively skewed
3. Roughly symmetrical

30. Here are the numbers of calls received during 20 randomly chosen, 15-minute time intervals at a customer support service:

2, 4, 6, 7, 8, 9, 11, 11, 12, 12, 13, 14, 14, 14, 16, 16, 18, 19, 21, 24.

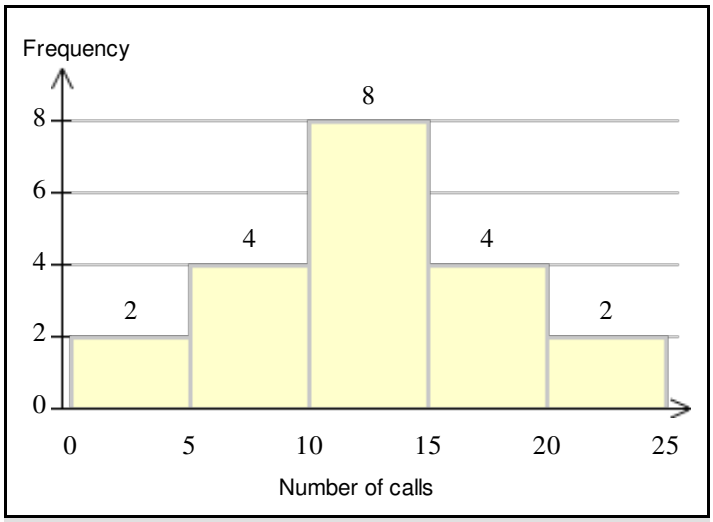


Figure 1

(a) For these data, which measures of central tendency take more than one value? Choose all that apply.

1. Mean
2. Median
3. Mode
4. None of these measures

(b) Suppose that the measurement 24 (the largest measurement in the data set) were replaced by 44. Which measures of central tendency would be affected by the change? Choose all that apply.

1. Mean
2. Median
3. Mode
4. None of these measures

(c) Suppose that, starting with the original data set, the smallest measurement were removed. Which measures of central tendency would be changed from those of the original data set? Choose all that apply.

1. Mean

2. Median
3. Mode
4. None of these measures

(d) Which of the following best describes the distribution of the original data? Choose only one.

1. Negatively skewed
2. Positively skewed
3. Roughly symmetrical

31. An intelligence test that has a maximum time for completion of 45 minutes was recently administered to a group of 21 people. Their respective times for completion (in minutes) were as follows:

24, 29, 31, 32, 33, 33, 36, 37, 38, 38, 38, 39, 39, 41, 42, 42, 42, 43, 43, 44, 44.

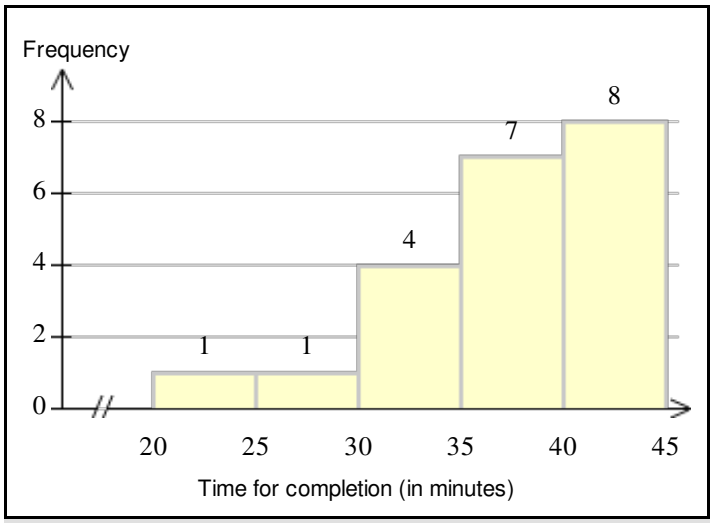


Figure 1

(a) Which measures of central tendency do not exist for this data set? Choose all that apply.

1. Mean
2. Median
3. Mode
4. None of these measures

(b) Suppose that the measurement 24 (the smallest measurement in the data set) were replaced by 8. Which measures of central tendency would be affected by the change? Choose all that apply.

1. Mean
2. Median
3. Mode
4. None of these measures

(c) Suppose that, starting with the original data set, the smallest measurement were removed. Which measures of central tendency would be changed from those of the original data set? Choose all that apply.

1. Mean
2. Median
3. Mode
4. None of these measures

(d) The relative values of the mean and median for the original data set are typical of data that have a significant skew to the left. What are the relative values of the mean and median for the original data set? Choose only one.

1. Mean is greater
2. Median is greater
3. Cannot be determined

32. On each trial of an experiment, a participant is presented with a constant soft noise, which is interrupted at some unpredictable time by a slightly louder sound. The time it takes for the participant to react to the louder sound is recorded. The following list contains the reaction times (in milliseconds) for 25 trials of this experiment:

156, 207, 215, 240, 240, 241, 259, 284, 286, 286, 296, 307, 311, 312, 329, 349, 357, 393, 394, 413, 417, 467, 538, 676, 891.

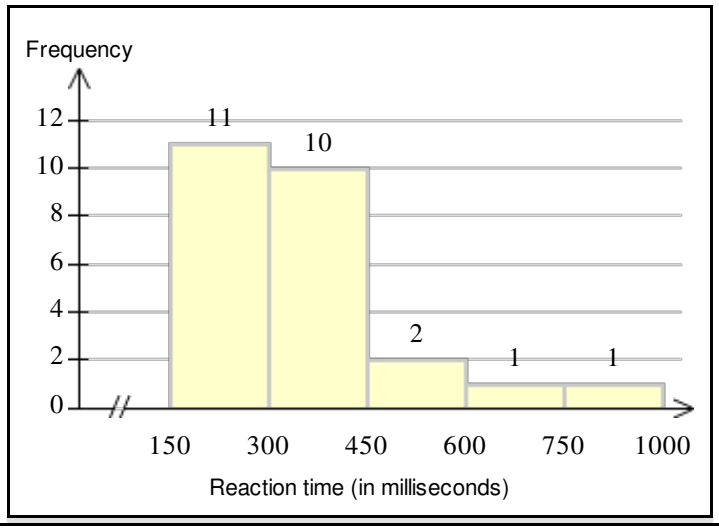


Figure 1

(a) For these data, which measures of central tendency take more than one value? Choose all that apply.

1. Mean
2. Median
3. Mode
4. None of these measures

(b) Suppose that the measurement 156 (the smallest measurement in the data set) were replaced by 72. Which measures of central tendency would be affected by the change? Choose all that apply.

1. Mean
2. Median
3. Mode
4. None of these measures

(c) Suppose that, starting with the original data set, the largest measurement were removed. Which measures of central tendency would be changed from those of the original data set? Choose all that apply.

1. Mean
2. Median
3. Mode
4. None of these measures

(d) The relative values of the mean and median for the original data set are typical of data that have a significant skew to the right. What are the relative values of the mean and median for the original data set? Choose only one.

1. Mean is greater
2. Median is greater
3. Cannot be determined

33. Let Z be a standard normal random variable. Calculate the following probabilities using the calculator provided. Round your responses to at least three decimal places.

$P(Z \leq 1.51) =$
$P(Z > 1.31) =$
$P(-1.38 < Z < 1.95) =$

34. Let Z be a standard normal random variable. Use the calculator provided to determine the value of c such that

$$P(Z \leq c) = 0.8315.$$

Carry your intermediate computations to at least four decimal places. Round your answer to at least two decimal places.

35. Let Z be a standard normal random variable. Use the calculator provided to determine the value of c such that

$$P(-c \leq Z \leq c) = 0.9596.$$

Carry your intermediate computations to at least four decimal places. Round your answer to at least two decimal places.

36. Let Z be a standard normal random variable. Use the calculator provided to determine the value of c such that

$$P(Z \leq c) = 0.1515.$$

Carry your intermediate computations to at least four decimal places. Round your answer to at least two decimal places.

37. Let Z be a standard normal random variable. Use the calculator provided to determine the value of c such that

$$P(c \leq Z \leq 0.57) = 0.6950.$$

Carry your intermediate computations to at least four decimal places. Round your answer to at least two decimal places.

38. Let Z be a standard normal random variable. Use the calculator provided to determine the value of c such that

$$P(1.19 \leq Z \leq c) = 0.1028.$$

Carry your intermediate computations to at least four decimal places. Round your answer to at least two decimal places.

39. Let Z be a standard normal random variable. Use the calculator provided to determine the value of c such that

$$P(c \leq Z \leq 0.82) = 0.7732.$$

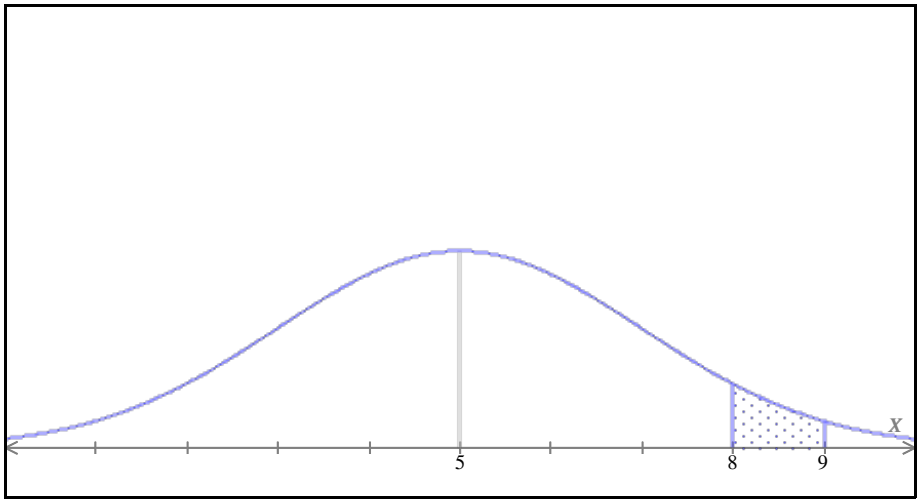
Carry your intermediate computations to at least four decimal places. Round your answer to at least two decimal places.

40. Let Z be a standard normal random variable. Use the calculator provided to determine the value of c such that

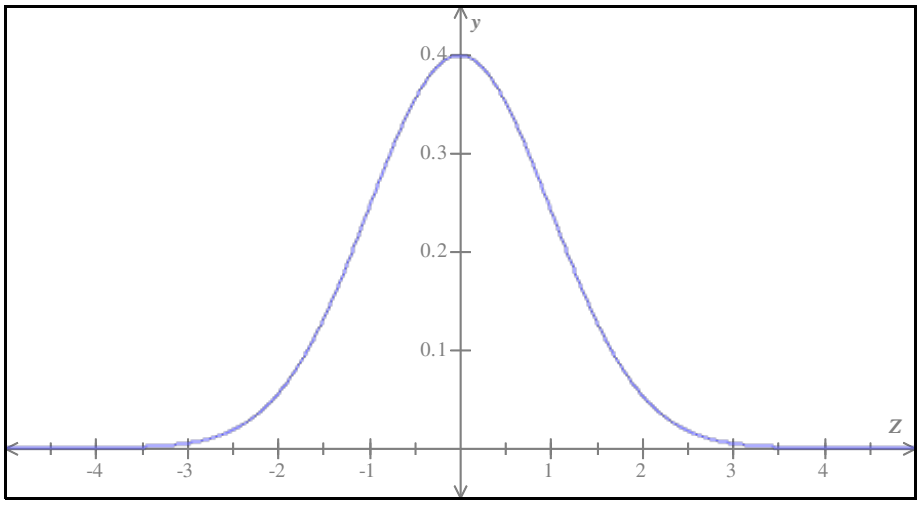
$$P(0.52 \leq Z \leq c) = 0.2828.$$

Carry your intermediate computations to at least four decimal places. Round your answer to at least two decimal places.

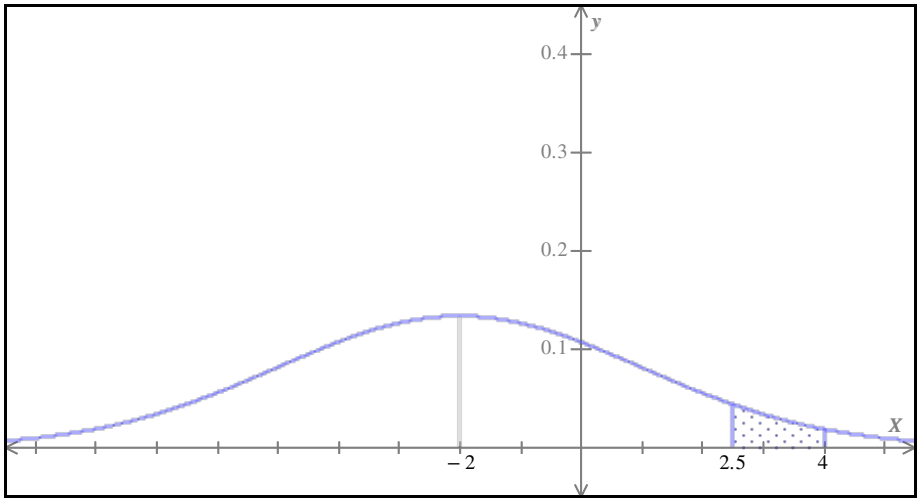
41. Below is a graph of a normal distribution with mean $\mu = 5$ and standard deviation $\sigma = 2$. The shaded region represents the probability of obtaining a value from this distribution that is between 8 and 9.



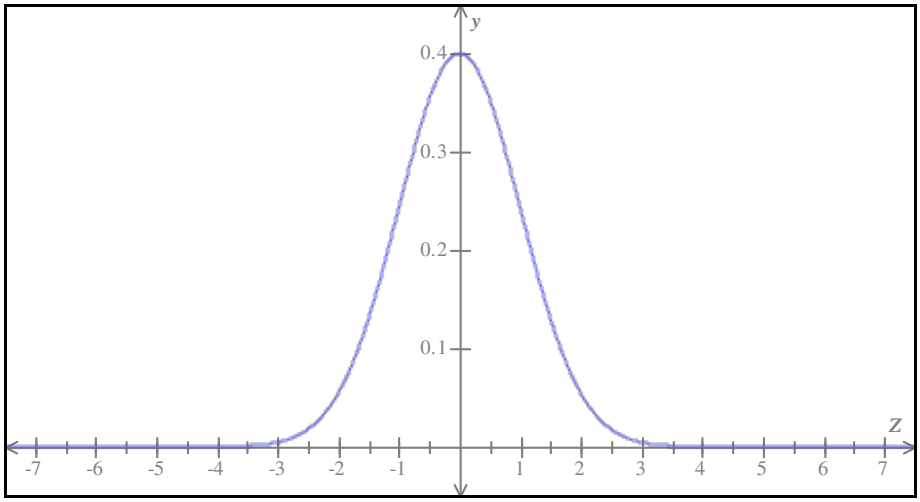
Shade the corresponding region under the standard normal density curve below.



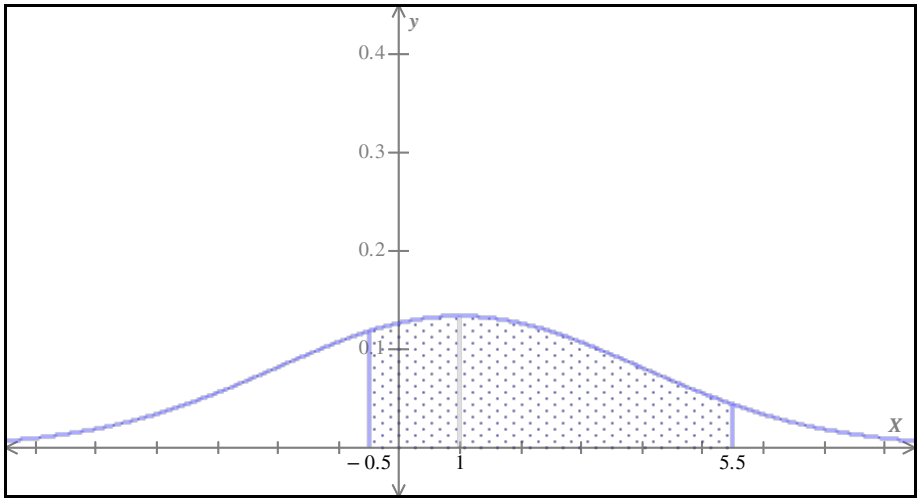
42. Below is a graph of a normal distribution with mean $\mu = -2$ and standard deviation $\sigma = 3$. The shaded region represents the probability of obtaining a value from this distribution that is between 2.5 and 4.



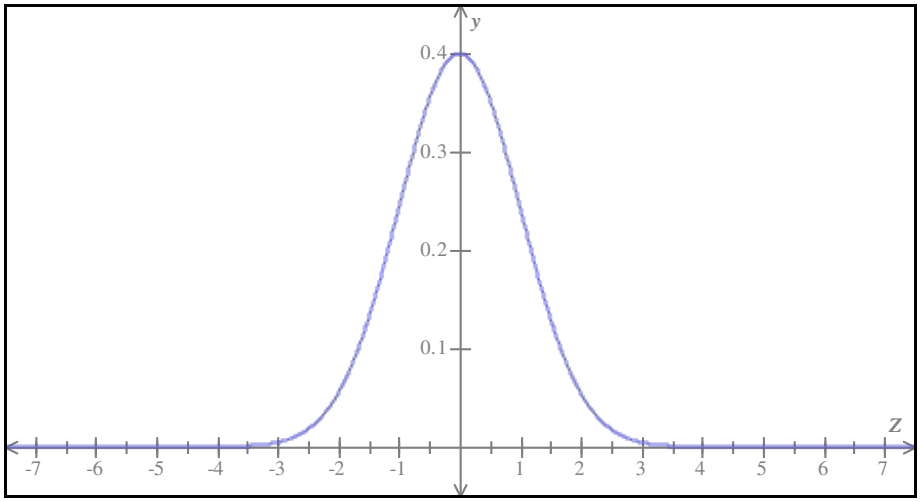
Shade the corresponding region under the standard normal density curve below.



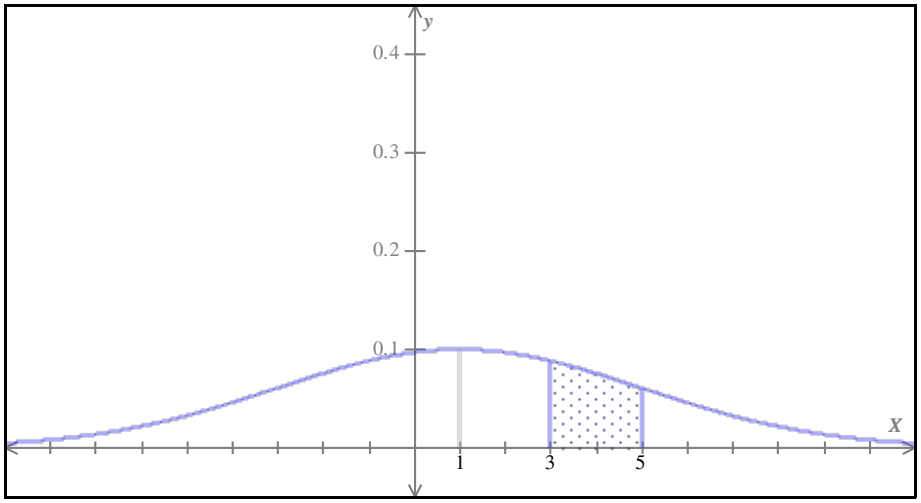
43. Below is a graph of a normal distribution with mean $\mu = 1$ and standard deviation $\sigma = 3$. The shaded region represents the probability of obtaining a value from this distribution that is between -0.5 and 5.5.



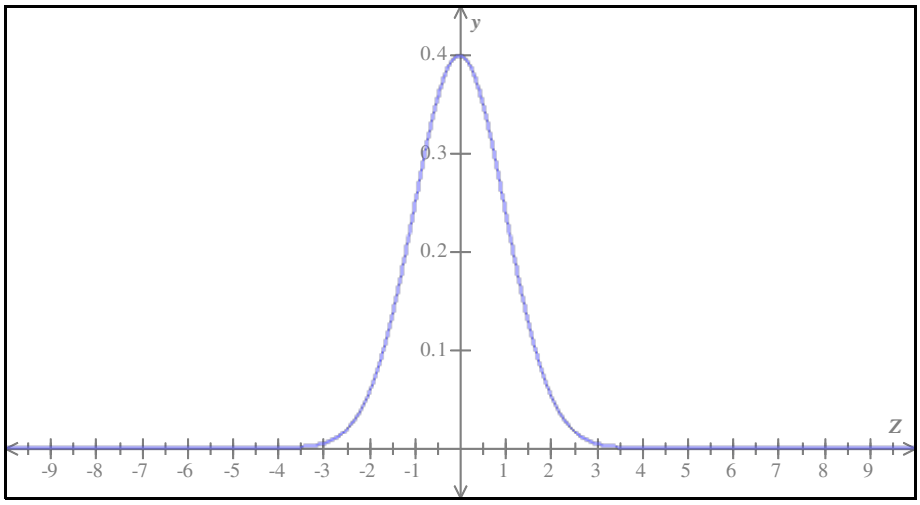
Shade the corresponding region under the standard normal density curve below.



44. Below is a graph of a normal distribution with mean $\mu = 1$ and standard deviation $\sigma = 4$. The shaded region represents the probability of obtaining a value from this distribution that is between 3 and 5.



Shade the corresponding region under the standard normal density curve below.



45. A newspaper article reported that people spend a mean of 6.5 hours per day watching TV, with a standard deviation of 2.1 hours. A psychologist would like to conduct interviews with the 20% of the population who spend the most time watching TV. She assumes that the daily time people spend watching TV is normally distributed. At least how many hours of daily TV watching are necessary for a person to be eligible for the interview? Carry your intermediate computations to at least four decimal places. Round your answer to at least one decimal place.

46. Risk taking is an important part of investing. In order to make suitable investment decisions on behalf of their customers, portfolio managers give a questionnaire to new customers to measure their desire to take financial risks. The scores on the questionnaire are approximately normally distributed with a mean of 50.5 and a standard deviation of 16. The customers with scores in the bottom 15% are described as "risk averse." What is the questionnaire score that separates customers who are considered risk averse from those who are not? Carry your intermediate computations to at least four decimal places. Round your answer to at least one decimal place.

47. Suppose that the heights of adult women in the United States are normally distributed with a mean of 64 inches and a standard deviation of 2.5 inches. Jennifer is taller than 80% of the population of U.S. women. How tall (in inches) is Jennifer? Carry your intermediate computations to at least four decimal places. Round your answer to at least one decimal place.

48. The distribution of scores on a standardized aptitude test is approximately normal with a mean of 510 and a standard deviation of 105. What is the minimum score needed to be in the top 10% on this test? Carry your intermediate computations to at least four decimal places, and round your answer to the nearest integer.

49. Suppose that the time required to complete a 1040R tax form is normally distributed with a mean of 90 minutes and a standard deviation of 20 minutes. What proportion of 1040R tax forms will be completed in less than 78 minutes? Round your answer to at least four decimal places.

50. Suppose that pulse rates among healthy adults are normally distributed with a mean of 81 beats/second and a standard deviation of 8 beats/second. What proportion of healthy adults have pulse rates that are at least 66 beats/sec? Round your answer to at least four decimal places.

51. Suppose that the annual rate of return for a common biotechnology stock is normally distributed with a mean of 6% and a standard deviation of 6% . Find the probability that the one-year return of this stock will be negative. Round your answer to at least four decimal places.

52. Suppose that the scores on a reading ability test are normally distributed with a mean of 65 and a standard deviation of 8. What proportion of individuals score less than 81 points on this test? Round your answer to at least four decimal places.

53. Below are four bivariate data sets and the scatter plot for each. (Note that each scatter plot is displayed on the same scale.) Each data set is made up of sample values drawn from a population.

x	*y*
1.0	8.0
2.0	5.0
3.0	9.7
4.0	5.9
5.0	2.3
6.0	4.6
7.0	9.0
8.0	3.4
9.0	9.4
10.0	6.9

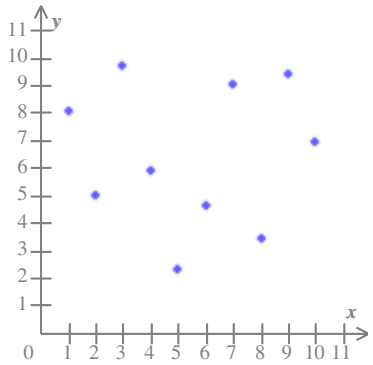


Figure 1

u	*v*
1.0	8.3
2.0	7.1
3.0	7.6
4.0	5.8
5.0	6.8
6.0	4.2
7.0	5.0
8.0	3.6
9.0	3.9
10.0	3.2

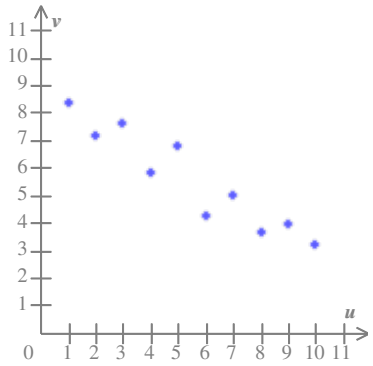


Figure 2

w	*t*
1.0	10.0
2.0	9.0
3.0	8.0
4.0	7.0
5.0	6.0
6.0	5.0
7.0	4.0
8.0	3.0
9.0	2.0
10.0	1.0

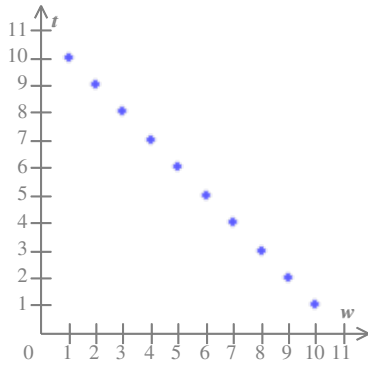


Figure 3

m	*n*
1.0	4.3
2.0	6.0
3.0	7.4
4.0	4.4
5.0	5.1
6.0	7.9
7.0	5.5
8.0	7.0
9.0	9.1
10.0	7.4

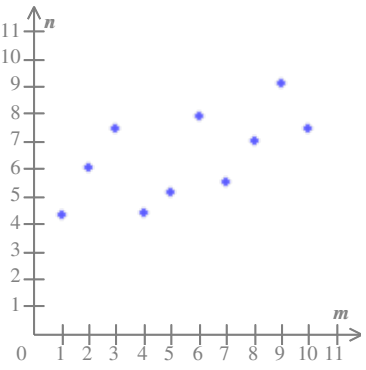


Figure 4

Answer the following questions about the relationships between pairs of variables and the values of *r*, the sample correlation coefficient. The same response may be the correct answer for more than one question.

1. For which data set is the sample correlation coefficient ***r*** equal to 1?
    a. the *x*, *y* data set
    b. the *u*, *v* data set
    c. the *w*, *t* data set
    d. the *m*, *n* data set
    e. none of the data sets
2. Which data set indicates the strongest positive linear relationship between its two variables?
    a. the *x*, *y* data set
    b. the *u*, *v* data set
    c. the *w*, *t* data set
    d. the *m*, *n* data set
3. Which data set has an apparent positive, but not perfect, linear relationship between its two variables?
    a. the *x*, *y* data set
    b. the *u*, *v* data set
    c. the *w*, *t* data set
    d. the *m*, *n* data set
    e. none of the data sets
4. For which data set is the sample correlation coefficient ***r*** closest to 0?
    a. the *x*, *y* data set
    b. the *u*, *v* data set
    c. the *w*, *t* data set
    d. the *m*, *n* data set

54. Below are four bivariate data sets and the scatter plot for each. (Note that each scatter plot is displayed on the same scale.) Each data set is made up of sample values drawn from a population.

x	y
1.0	8.1
2.0	4.7
3.0	9.9
4.0	6.4
5.0	2.2
6.0	5.0
7.0	8.7
8.0	3.8
9.0	9.5
10.0	6.5

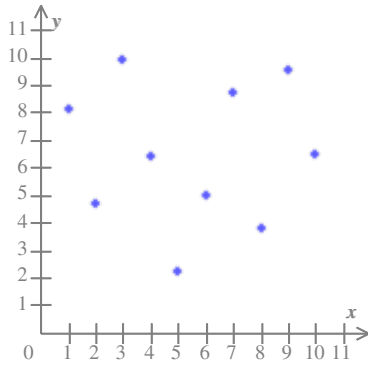


Figure 1

u	v
1.0	10.0
2.0	9.0
3.0	8.0
4.0	7.0
5.0	6.0
6.0	5.0
7.0	4.0
8.0	3.0
9.0	2.0
10.0	1.0

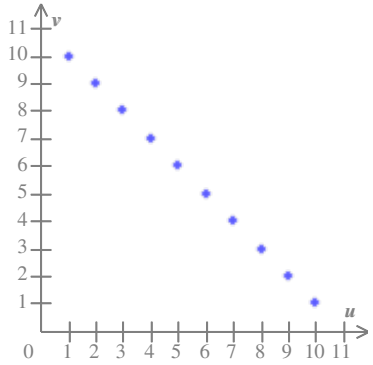


Figure 2

w	t
1.0	7.4
2.0	9.3
3.0	6.6
4.0	5.5
5.0	7.7
6.0	4.9
7.0	4.7
8.0	7.3
9.0	6.0
10.0	4.4

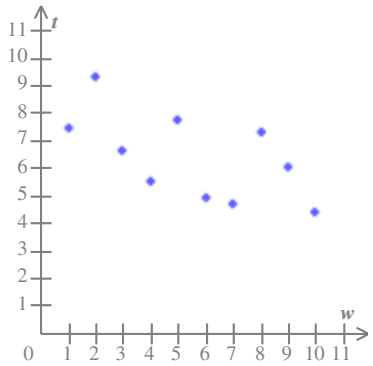


Figure 3

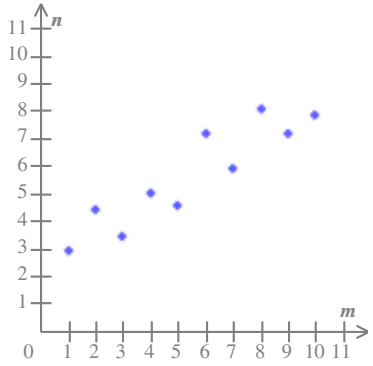


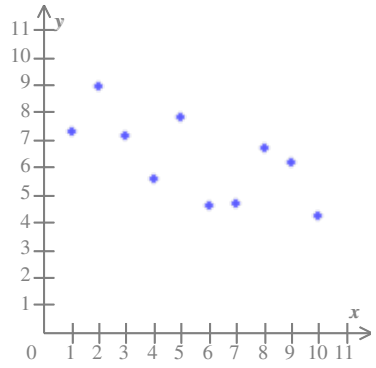
Figure 4

m	*n*
1.0	2.9
2.0	4.4
3.0	3.4
4.0	5.0
5.0	4.5
6.0	7.1
7.0	5.9
8.0	8.0
9.0	7.1
10.0	7.8

Answer the following questions. The same response may be the correct answer for more than one question.

1. In which data set is there evidence of a strong nonlinear relationship between the two variables?
   a. the *x*, *y* data set
   b. the *u*, *v* data set
   c. the *w*, *t* data set
   d. the *m*, *n* data set
   e. none of the data sets
2. Which data set has an apparent negative, but not perfect, linear relationship between its two variables?
   a. the *x*, *y* data set
   b. the *u*, *v* data set
   c. the *w*, *t* data set
   d. the *m*, *n* data set
   e. none of the data sets
3. Which data set indicates the strongest positive linear relationship between its two variables?
   a. the *x*, *y* data set
   b. the *u*, *v* data set
   c. the *w*, *t* data set
   d. the *m*, *n* data set
4. Which data set indicates a perfect negative linear relationship between its two variables?
   a. the *x*, *y* data set
   b. the *u*, *v* data set
   c. the *w*, *t* data set
   d. the *m*, *n* data set
   e. none of the data sets

55. Below are four bivariate data sets and the scatter plot for each. (Note that each scatter plot is displayed on the same scale.) Each data set is made up of sample values drawn from a population.



x	y
1.0	7.3
2.0	9.0
3.0	8.0
4.0	7.0
5.0	6.9
6.0	5.9
7.0	4.9
8.0	3.9
9.0	2.0
10.0	1.0

Figure 1

u	v
1.0	10.0
3.0	7.1
2.0	9.0
4.0	5.6
3.0	8.0
5.0	7.8
4.0	7.0
6.0	4.6
5.0	6.9
7.0	4.7
6.0	5.9
8.0	6.7
7.0	4.9
9.0	6.2
8.0	3.9
10.0	4.2
9.0	2.0
10.0	1.0

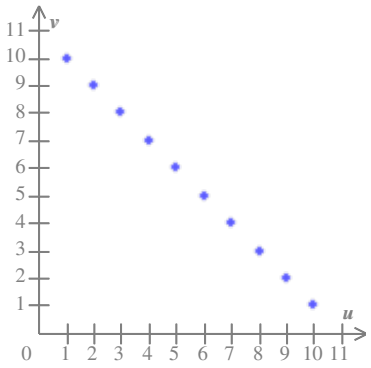


Figure 2

w	t
1.0	7.8
2.0	5.3
3.0	3.2
4.0	2.2
5.0	1.9
6.0	1.9
7.0	2.3
8.0	3.0
9.0	5.5
10.0	7.5

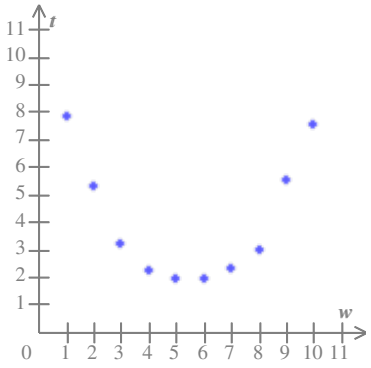


Figure 3

m	n
1.0	3.2
2.0	4.1
3.0	3.6
4.0	4.7
5.0	4.4
6.0	7.4
7.0	6.2
8.0	7.7
9.0	6.7
10.0	8.0

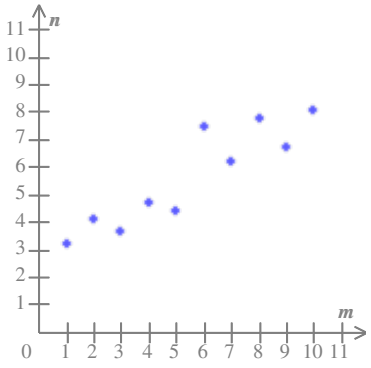


Figure 4

Answer the following questions. The same response may be the correct answer for more than one question.

1. Which data set indicates the strongest negative linear relationship between its two variables?
   a. the *x*, *y* data set
   b. the *u*, *v* data set
   c. the *w*, *t* data set
   d. the *m*, *n* data set
2. Which data set has an apparent positive, but not perfect, linear relationship between its two

variables?

a. the x, y data set
b. the u, v data set
c. the w, t data set
d. the m, n data set
e. none of the data sets

3. Which data set indicates a perfect positive linear relationship between its two variables?
   a. the x, y data set
   b. the u, v data set
   c. the w, t data set
   d. the m, n data set
   e. none of the data sets
4. In which data set is there evidence of a strong nonlinear relationship between the two variables?
   a. the x, y data set
   b. the u, v data set
   c. the w, t data set
   d. the m, n data set
   e. none of the data sets

56. Below are four bivariate data sets and the scatter plot for each. (Note that each scatter plot is displayed on the same scale.) Each data set is made up of sample values drawn from a population.

x	*y*
1.0	4.0
2.0	6.1
3.0	7.2
4.0	4.5
5.0	5.1
6.0	8.3
7.0	5.7
8.0	6.9
9.0	9.0
10.0	7.8

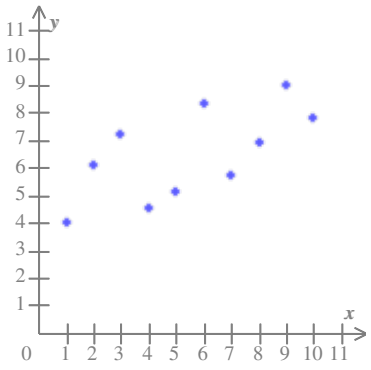


Figure 1

u	*v*
1.0	7.8
2.0	6.7
3.0	7.6
4.0	6.1
5.0	6.7
6.0	4.5
7.0	5.2
8.0	3.6
9.0	4.0
10.0	3.2

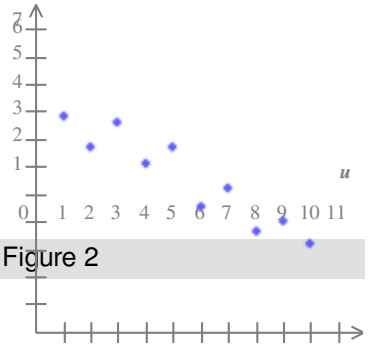


Figure 2

w	*t*
1.0	3.3
2.0	4.3
3.0	3.2
4.0	5.2
5.0	4.4
6.0	7.1
7.0	5.9
8.0	7.5
9.0	7.2
10.0	7.8

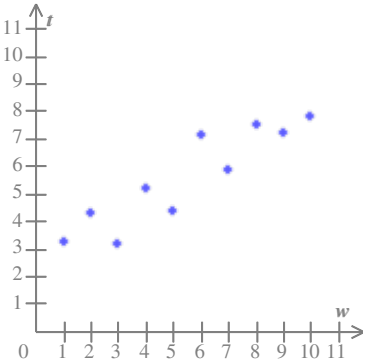


Figure 3

m	*n*
1.0	7.0
2.0	9.6
3.0	3.8
4.0	9.4
5.0	4.9
6.0	2.1
7.0	6.0
8.0	10.3
9.0	4.9
10.0	8.2

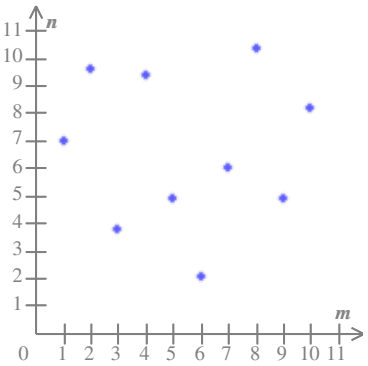


Figure 4

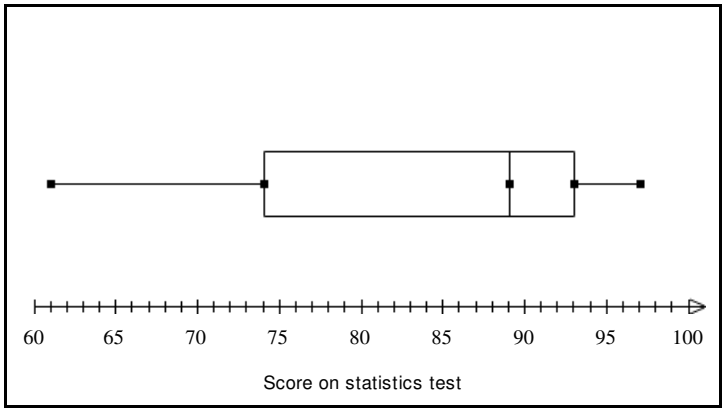
Answer the following questions about the relationships between pairs of variables and the values of *r*, the sample correlation coefficient. The same response may be the correct answer for more than one question.

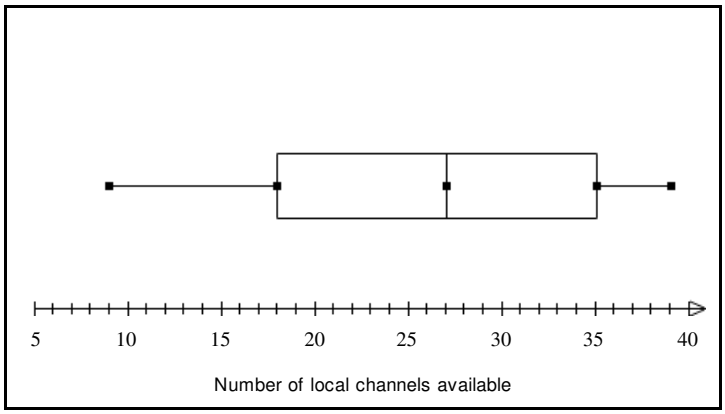
1. Which data set indicates the strongest positive linear relationship between its two variables?
    a. the *x*, *y* data set
    b. the *u*, *v* data set
    c. the *w*, *t* data set
    d. the *m*, *n* data set
2. For which data set is the sample correlation coefficient ***r*** closest to -1?

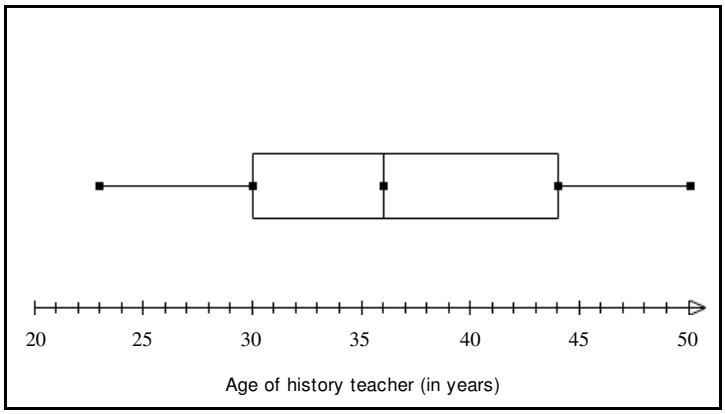
a. the x, y data set
b. the u, v data set
c. the w, t data set
d. the m, n data set

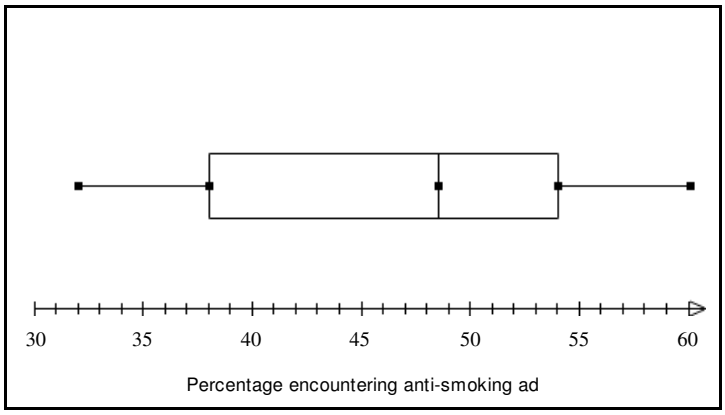
3. For which data set is the sample correlation coefficient $\boldsymbol{r}$ closest to 0?
   a. the x, y data set
   b. the u, v data set
   c. the w, t data set
   d. the m, n data set
4. For which data set is the sample correlation coefficient $\boldsymbol{r}$ equal to 1?
   a. the x, y data set
   b. the u, v data set
   c. the w, t data set
   d. the m, n data set
   e. none of the data sets

Homework 3 #1 Answers for class Introduction to Statistics / Math 117 Statistics









5.

(a) What is the mean of this data set? If your answer is not an integer, round your answer to at least one decimal place.
73.3

(b) What is the median of this data set? If your answer is not an integer, round your answer to at least one decimal place.
90

(c) How many modes does the data set have, and what are their values? Indicate the number of modes by selecting the appropriate line, and then indicate the value(s) of the mode(s), if applicable.
one mode: 95

6.

(a) What is the median of this data set? If your answer is not an integer, round your answer to at least one decimal place.
45

(b) What is the mean of this data set? If your answer is not an integer, round your answer to at least one decimal place.
45.5

(c) How many modes does the data set have, and what are their values? Indicate the number of modes by selecting the appropriate line, and then indicate the value(s) of the mode(s), if applicable.
one mode: 36

7.

(a) What is the mean of this data set? If your answer is not an integer, round your answer to at least one decimal place.

505.3

(b) What is the median of this data set? If your answer is not an integer, round your answer to at least one decimal place.

443

(c) How many modes does the data set have, and what are their values? Indicate the number of modes by selecting the appropriate line, and then indicate the value(s) of the mode(s), if applicable.

one mode: 443

8.

(a) What is the median of this data set? If your answer is not an integer, round your answer to at least one decimal place.

21.5

(b) What is the mean of this data set? If your answer is not an integer, round your answer to at least one decimal place.

20.9

(c) How many modes does the data set have, and what are their values? Indicate the number of modes by selecting the appropriate line, and then indicate the value(s) of the mode(s), if applicable.

one mode: 25

9. ☐	Last year, the number of their clients who made a profit of less than 9% was equal to the number of their clients who made a profit of more than 9%.
☐	Two years ago some of their clients made a profit of at least 9%.
☐	Last year at least one of their clients made a profit of exactly 9%.
☑	Last year at least one of their clients made a profit of more than 3%.
☐	Last year all of their clients made a profit of 9% or more.
☐	None of the above statements is true.

10. ☑	Last year at least one of their freshman students had a score of less than 1400 on the exam.
☐	Last year, the number of their freshman students who had a score of 1200 or below on the exam was equal to the number of their freshman students who had a score of 1200 or above on the exam.
☐	Next year at least one of their freshman students will have a score of at least 1200 on the exam.
☐	Last year some of their freshman students had a score of exactly 1200 on the exam.
☐	Last year all of their freshman students had a score of at least 1200 on the exam.
☐	None of the above statements is true.

11. ☐	Last year, the number of their clients who had a starting salary of $39,000 or below was equal to the number of their clients who had a starting salary of $39,000 or above.
☐	Two years ago some of their clients had a starting salary of at least $39,000 .
☐	Last year at least one of their clients had a starting salary of exactly $39,000 .
☐	Last year all of their clients had a starting salary of less than $43,000 .
☑	Last year at least one of their clients had a starting salary of $39,000 or above.
☐	None of the above statements is true.

12. ☐	Last year fewer than half of their clients made a profit of 9% or less.
☐	Last year at least one of their clients made a profit of exactly 9%.
☐	Last year at least one of their clients made a profit of more than 13% .
☐	This year some of their clients will make a profit of at least 9%.
☑	Last year some of their clients made a profit of 9% or more.
☐	None of the above statements is true.

13. 79.3

14. $8.81

15. $2063

16. 3.2 books

17. 7.64

18. 8.00

19. 6.07

20. 2.31

21. 8.53

22. 2.55

23. 2.92

24. 5.34

25.

(a) According to Chebyshev's theorem, at least 84% of the measurements lie between 115.3 mmHg and 149.8mmHg.

(b) According to Chebyshev's theorem, at least 75% of the measurements lie between 118.7 mmHg and 146.3 mmHg.

(c) Suppose that the distribution is bell-shaped. According to the empirical rule, approximately 95% of the measurements lie between 118.7 mmHg and 146.3 mmHg.

(d) Suppose that the distribution is bell-shaped. According to the empirical rule, approximately 68% of the measurements lie between 125.6mmHg and 139.4mmHg.

26.

(a) According to Chebyshev's theorem, at least 75% of the relative increases in stock price lie between 0.43 % and 1.07 %.

(b) According to Chebyshev's theorem, at least 8/9 (about 89%) of the relative increases in stock price lie between 0.27% and 1.23%.

(c) Suppose that the distribution is bell-shaped. According to the empirical rule, approximately 68% of the relative increases in stock price lie between 0.59% and 0.91%.

(d) Suppose that the distribution is bell-shaped. According to the empirical rule, approximately 95% of the relative increases in stock price lie between 0.43 % and 1.07 %.

27.

(a) According to Chebyshev's theorem, at least 75% of the fares lie between 19.79 dollars and 36.23 dollars.

(b) According to Chebyshev's theorem, at least 36% of the fares lie between 22.87dollars and 33.15dollars.

(c) Suppose that the distribution is bell-shaped. According to the empirical rule, approximately 68% of the fares lie between 23.90dollars and 32.12dollars.

(d) Suppose that the distribution is bell-shaped. According to the empirical rule, approximately 95% of the fares lie between 19.79 dollars and 36.23 dollars.

28.

(a) According to Chebyshev's theorem, at least 75% of the commute distances lie between 10.1 miles and 22.5 miles.

(b) According to Chebyshev's theorem, at least 56% of the commute distances lie between 11.65 miles and 20.95 miles.

(c) Suppose that the distribution is bell-shaped. According to the empirical rule, approximately 95% of the commute distances lie between 10.1 miles and 22.5 miles.

(d) Suppose that the distribution is bell-shaped. According to the empirical rule, approximately 68% of the commute distances lie between 13.2miles and 19.4miles.

29. (a) 4. None of these measures
(b) 1. Mean
(c) 1. Mean
2. Median
(d) 2. Positively skewed

30. (a) 4. None of these measures
(b) 1. Mean
(c) 1. Mean
2. Median
(d) 3. Roughly symmetrical

31. (a) 4. None of these measures
(b) 1. Mean
(c) 1. Mean
2. Median
(d) 2. Median is greater

32. (a) 3. Mode
(b) 1. Mean
(c) 1. Mean
2. Median
(d) 1. Mean is greater

33. $P(Z \leq 1.51) = 0.934$
$P(Z > 1.31) = 0.095$
$P(-1.38 < Z < 1.95) = 0.891$

34. 0.96

35. 2.05

36. -1.03

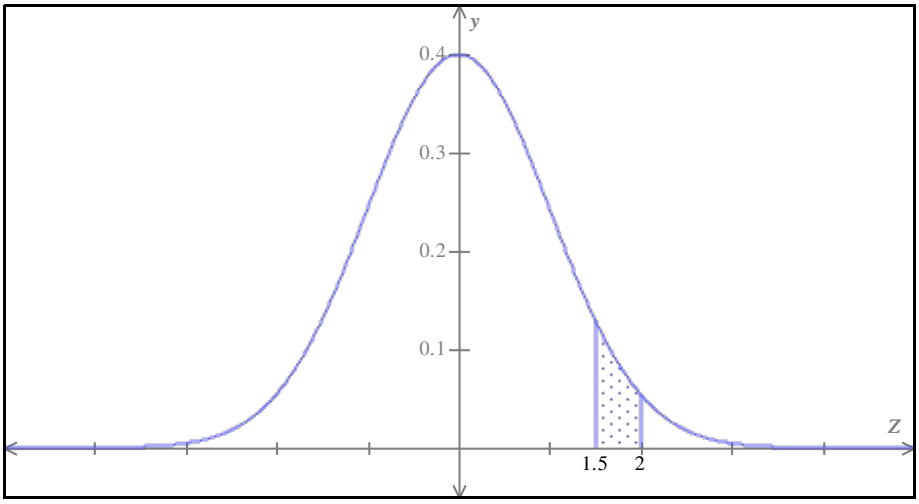
37. -2.04

38. 2.19

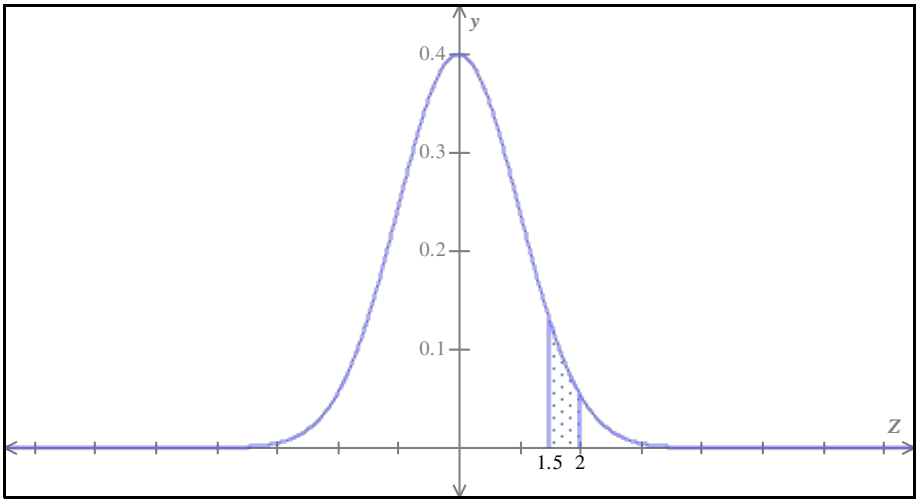
39. -2.04

40. 2.08

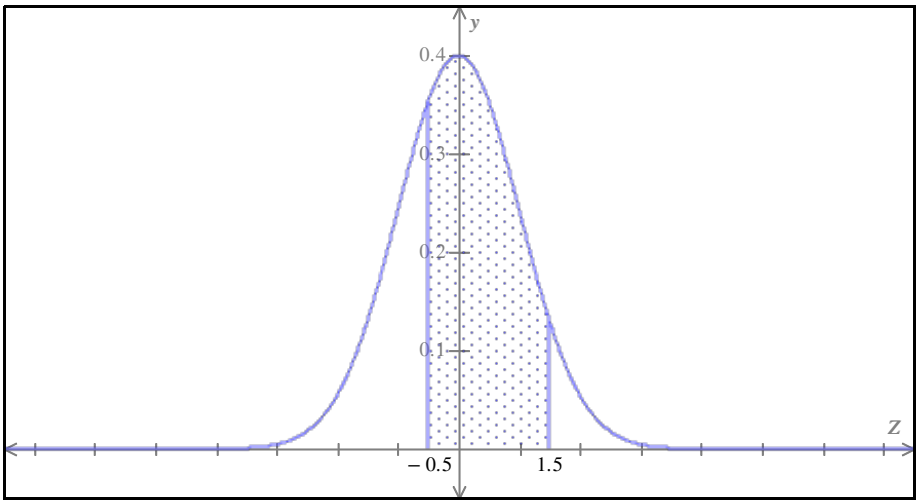
41.



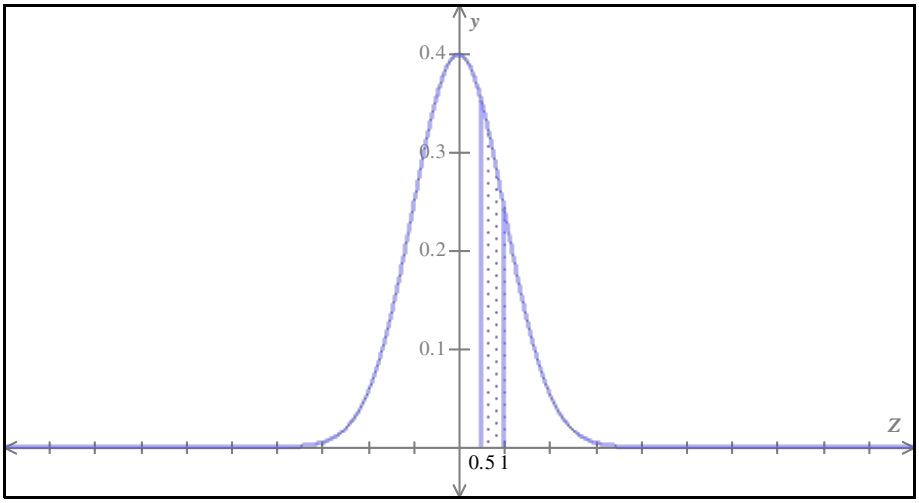
42.



43.



44.



45. 8.3 hours

46. 33.9

47. 66.1 inches

48. 645

49. 0.2743

50. 0.9696

51. 0.1587

52. 0.9772

53. 1. For which data set is the sample correlation coefficient r equal to 1?
e. none of the data sets
2. Which data set indicates the strongest positive linear relationship between its two variables?
d. the m, n data set
3. Which data set has an apparent positive, but not perfect, linear relationship between its two variables?
d. the m, n data set
4. For which data set is the sample correlation coefficient r closest to 0?
a. the x, y data set

54. 1. In which data set is there evidence of a strong nonlinear relationship between the two variables?
e. none of the data sets
2. Which data set has an apparent negative, but not perfect, linear relationship between its two variables?
c. the w, t data set
3. Which data set indicates the strongest positive linear relationship between its two variables?
d. the m, n data set
4. Which data set indicates a perfect negative linear relationship between its two variables?
b. the u, v data set

55. 1. Which data set indicates the strongest negative linear relationship between its two variables?
b. the u, v data set
2. Which data set has an apparent positive, but not perfect, linear relationship between its two variables?
d. the m, n data set
3. Which data set indicates a perfect positive linear relationship between its two variables?
e. none of the data sets
4. In which data set is there evidence of a strong nonlinear relationship between the two variables?
c. the w, t data set

56. 1. Which data set indicates the strongest positive linear relationship between its two variables?
c. the w, t data set

2. For which data set is the sample correlation coefficient r closest to -1?
b. the u, v data set

3. For which data set is the sample correlation coefficient r closest to 0?
d. the m, n data set

4. For which data set is the sample correlation coefficient r equal to 1?
e. none of the data sets