Testbank

to accompany

Australasian Business Statistics 4th Edition

by Black et al.

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WILEY

Chapter 3
Descriptive summary measures

True/False Questions

1. Statistical measures used to yield information about the middle of a group of numbers are called measures of central tendency.

*a. True
b. False

General Feedback:
Section 3.1, Difficulty: Easy

2. The most frequently occurring value in a set of data is called the mean.

a. True
*b. False

General Feedback:
Section 3.1, Difficulty: Easy

3. The middle value in an ordered array of numbers is called the median.

*a. True
b. False

General Feedback:
Section 3.1, Difficulty: Easy

4. The Greek letter μ usually refers to the population mean.

*a. True
b. False

General Feedback:
Section 3.1, Difficulty: Easy

5. The lowest appropriate level of measurement for the mean is interval.

*a. True

b. False

General Feedback:
Section 3.1, Difficulty: Easy

6. The lowest appropriate level of measurement for the mode is ordinal.

a. True
*b. False

General Feedback:
Section 3.1, Difficulty: Easy

7. Another term for average is mode.

a. True
*b. False

General Feedback:
Section 3.1, Difficulty: Easy

8. The Greek letter σ usually refers to the population mean.

a. True
*b. False

General Feedback:
Section 3.1, Difficulty: Easy

9. The notation s2 usually refers to the sample variance.

*a. True
b. False

General Feedback:
Section 3.1, Difficulty: Easy

10. The sum of deviations about the arithmetic mean is always equal to the variance.

a. True
*b. False

General Feedback:
Section 3.1, Difficulty: Easy

11. The lowest appropriate level of measurement for the Interquartile Range is ordinal.

*a. True
b. False

General Feedback:
Section 3.2, Difficulty: Easy

12. The five numbers used to construct a box and whisker plot are the mean, standard deviation, Q1, Q3, and the coefficient of variation.

a. True
*b. False

General Feedback:
Section 3.2, Difficulty, Medium

13. The interquartile range is negative if the distribution is skewed to the left.

a. True
*b. False

General Feedback:
Section 3.2, Difficulty: Easy

14. Coefficient of dispersion is a measure of relative dispersion.

*a. True
b. False

General Feedback:
Section 3.3, Difficulty: Medium

15. Average deviation is NOT a commonly used measure of variability.

*a. True
b. False

General Feedback:
Section 3.3, Difficulty: Medium

16. The empirical rule says that approximately 50% of the values will be within 1 standard deviation of the mean in a bell shaped set of data.

a. True
*b. False

General Feedback:
Section 3.3, Difficulty: Medium

17. Chebyshev's Theorem says that the number of values within 3 standard deviations of the mean will be at least 89%.

*a. True
b. False

General Feedback:
Section 3.3, Difficulty: Medium

18. A statistics student made the following grades on 5 tests: 84, 78, 88, 72 and 72. The median grade is 78.

*a. True
b. False

General Feedback:
Section 3.1, Difficulty: Medium

19. A commuter travels many kilometres to work each morning. She has timed this trip 5 times during the last month. The time (in minutes) required to make this trip was 34, 39, 41, 35 and 41. The modal time required for this trip was 39.

a. True
*b. False

General Feedback:
Section 3.1, Difficulty: Easy

20. Simon Arnett, Director of Human Resources, is exploring employee absenteeism at the Buderim Bottling during the last operating year. A sample of six personnel records produced the following data: 0, 2, 4, 7, 2, 9. The median number absences per employee is 3.

*a. True
b. False

General Feedback:
Section 3.1, Difficulty: Medium

21. The mean life of a particular brand of light bulb is 1000 hours and the standard deviation is 50 hours. It can be concluded that at least 89% of the bulbs will last between 850 and 1150 hours.

*a. True
b. False

General Feedback:
Section 3.3, Difficulty: Hard

22. The average starting salary for graduates at a university is $25,000 with a standard deviation of $2000. If a histogram of the data shows it takes on a mound shape, the empirical rule says that approximately 95% of the graduates would have a starting salary between $19,000 and $31,000.

a. True
*b. False

General Feedback:
Section 3.3, Difficulty: Medium

23. In its Industry Norms and Key Business Ratios, Dun & Bradstreet reported that Q1, Q2 and Q3 for 577 motorcycle dealers' current ratios were 1.3, 1.6 and 2.9, respectively. From this we can conclude that 50% of these dealers had current ratios of 2.9 or more.

a. True
*b. False

General Feedback:
Section 3.2, Difficulty: Medium

24. A sales manager has sampled past sales records to determine how many refrigerators are sold each day. Daily records for a sample of 10 days have been selected. The sales on these days are: 0, 4, 4, 2, 1, 3, 4, 5, 2, 7. The mean daily sales is 10.

a. True
*b. False

General Feedback:
Section 3.1, Difficulty: Medium

25. Consider the following 3 numbers: 10, 20, 30. In calculating measures of central tendency and variability for this set of data, you can calculate the variance only if you know if this is a sample or a population.

*a. True
b. False

General Feedback:
Section 3.3, Difficulty: Medium

26. Libby Cheung manages a portfolio of 250 common stocks. Her staff compiled the following performance statistics for two new stocks.
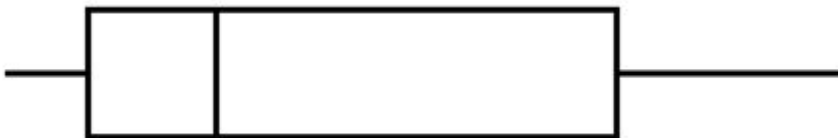
| | Rate of Return | |
Stock	Mean	Standard Deviation
Salas Products	15%	5%
Hot Boards	20%	5%

The coefficient of variation for Salas Products is greater than the coefficient of variation for Hot Boards.

*a. True
b. False

General Feedback:
Section 3.4, Difficulty: Medium

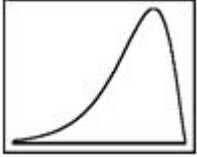27. The following box and whisker plot skewed to the left.

a. True
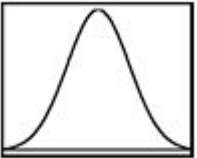*b. False

General Feedback:

Section 3.4, Difficulty: Easy

28. The following frequency distribution is skewed to the left.

*a. True
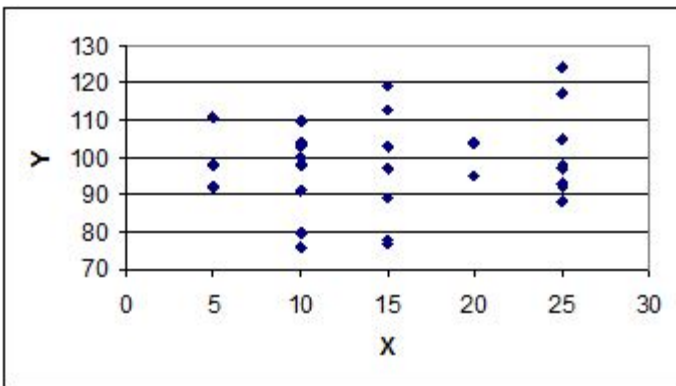b. False

General Feedback:
Section 3.4, Difficulty: Easy

29. The following frequency distribution is not skewed.

*a. True
b. False

General Feedback:
Section 3.4, Difficulty: Easy

30. According to the following graphic, X and Y show strong negative correlation.

a. True
*b. False

General Feedback:
Section 3.5, Difficulty: Easy

Multiple Choice Questions

31. Which of the following is an appropriate measure of central tendency for ordinal data?

a. Standard deviation.
b. Mean.
*c. Median.
d. Coefficient of variation.

General Feedback:
Section 3.1, Difficulty: Easy

32. The lowest appropriate level of measurement for the median is _____.

a. nominal
*b. ordinal
c. interval
d. ratio

General Feedback:
Section 3.1, Difficulty: Easy

33. The notation usually refers to the _____.

a. population standard deviation
b. sample variance
c. population mean
*d. sample mean

General Feedback:
Section 3.1, Difficulty: Easy

34. The average of the squared deviations from the arithmetic mean is called the _____.

a. standard deviation
b. mean absolute deviation
*c. variance
d. coefficient of variation

General Feedback:
Section 3.2, Difficulty: Medium

35. The lowest appropriate level of measurement for standard deviation is _____.

a. nominal
b. ordinal
*c. interval
d. ratio

General Feedback:
Section 3.2, Difficulty: Easy

36. The number of standard deviations that a value (X) is above or below the mean is the _____.

a. absolute deviation
b. coefficient of variation
c. interquartile range
*d. Z score

37. If the median of a distribution is greater than mean, then the distribution is _____.

a. not skewed
b. symmetrical about its mean
*c. skewed to the left
d. skewed to the right

General Feedback:
Section 3.3, Difficulty: Medium

38. The five numbers used to construct a box and whisker plot are _____.

a. the mean, standard deviation, q1, q3, and the coefficient of variation
*b. q1, q2, q3, the least value of x, and the largest value of x
c. the mean, standard deviation, least value of x, largest value of x, and q2
d. the coefficient of variation, IQR, mean, Q2, and mean absolute deviation

General Feedback:
Section 3.3, Difficulty: Medium

39. The empirical rule says that approximately what percentage of the values would be within 2 standard deviations of the mean in a bell shaped set of data?

*a. 95%
b. 68%
c. 50%
d. Almost all.

General Feedback:
Section 3.3, Difficulty: Medium

40. Chebyshev's Theorem says that how many values will be within 2 standard deviations of the mean?

*a. At least 75%.
b. At least 68%.
c. At least 95%.
d. At least 89%.

General Feedback:
Section 3.1, Difficulty: Hard

41. A statistics student made the following grades on 5 tests: 84, 78, 88, 78 and 72. What is the mean grade?

a. 78
*b. 80
c. 72
d. 84

General Feedback:
Section 3.1, Difficulty: Medium

42. A statistics student made the following grades on 5 tests: 84, 78, 88, 78 and 82. What is the mode?

*a. 78
b. 80
c. 88
d. 84

General Feedback:
Section 3.1, Difficulty: Easy

43. A commuter travels many kilometres to work each morning. She has timed this trip 5 times during the last month. The time (in minutes) required to make this trip was 34, 39, 41, 35 and 41. The median time required for this trip was _____.

*a. 39
b. 41
c. 37.5
d. 38

General Feedback:
Section 3.1, Difficulty: Medium

44. A commuter travels many kilometres to work each morning. She has timed this trip 5 times during the last month. The time (in minutes) required to make this trip was 44, 39, 41, 35 and 41. The mean time required for this trip was 40 minutes. What is the variance for this sample data?

a. 8.8
*b. 11
c. 0
d. 3

General Feedback:
Section 3.3, Difficulty: Hard

45. A commuter travels many kilometres to work each morning. She has timed this trip 5 times during the last month. The time (in minutes) required to make this trip was 44, 39, 41, 35 and 41. The mean time required for this trip was 40 minutes. What is the mean absolute deviation for this sample data?

a. 0
b. 12
c. 3
*d. 2.4

General Feedback:
Section 3.3, Difficulty: Hard

46. Simon Arnett, Director of Human Resources, is exploring employee absenteeism at the Buderim Bottling during the last operating year. A sample of six personnel records produced the following data: 0, 2, 4, 7, 2, 9. The modal number absences per employee is _____.

a. 3

*b. 2
c. 5.5
d. 4

General Feedback:
Section 3.2, Difficulty: Easy

47. Simon Arnett, Director of Human Resources, is exploring employee absenteeism at the Buderim Bottling during the last operating year. A sample of six personnel records produced the following data: 0, 2, 4, 7, 2, 9. The variance of the number absences per employee is
_____.

*a. 11.6
b. 9.67
c. 3.41
d. 3.11

General Feedback:
Section 3.3, Difficulty: Hard

48. The mean life of a particular brand of light bulb is 1000 hours and the standard deviation is 50 hours. It can be concluded that at least 75% of the bulbs will last between _____.

*a. 900 and 1100 hours
b. 950 and 1050 hours
c. 850 and 1150 hours
d. 800 and 1200 hours

General Feedback:
Section 3.3, Difficulty: Hard

49. The mean life of a particular brand of light bulb is 1000 hours and the standard deviation is 50 hours. Tests show that the life of the bulb is approximately normally distributed. It can be concluded that approximately 68% of the bulbs will last between _____.

a. 900 and 1100 hours
*b. 950 and 1050 hours
c. 850 and 1150 hours
d. 800 and 1200 hours

General Feedback:
Section 3.3, Difficulty: Medium

50. Jessica Salas, Managing Director of Salas Products, is reviewing the warranty policy for her company's new model of car batteries. Life tests performed on a sample of 100 batteries indicated: (1) an average life of 75 months, (2) a standard deviation of 5 months, and (3) battery life is approximately normally distributed. Approximately 95% of the batteries will last between _____.

a. 70 and 80 months
b. 60 and 90 months
*c. 65 and 85 months
d. 55 and 95 months

General Feedback:
Section 3.3, Difficulty: Medium

51. Jessica Salas, Managing Director of Salas Products, is reviewing the warranty policy for her company's new model of car batteries. Life tests performed on a sample of 100 batteries indicated: (1) an average life of 75 months, (2) a standard deviation of 5 months, and (3) battery life is approximately normally distributed. What percentage of the batteries will fail within the first 65 months of use?

a. 0.5%.
b. 1%.
*c. 2.5%.
d. 5%.

General Feedback:
Section 3.3, Difficulty: Hard

52. The average starting salary for graduates at a university is $25,000 with a standard deviation of $2000. If a histogram of the data shows the it takes on a mound shape, the empirical rule says that approximately 68% of the graduates would have a starting salary between _____.

*a. 23,000 and 27,000
b. 21,000 and 29,000
c. 19,000 and 31,000
d. 24,000 and 26,000

General Feedback:
Section 3.3, Difficulty: Medium

53. The average starting salary for graduates at a university is $25,000 with a standard deviation of $2000. A histogram of the data shows the shape to be very erratic so Chebyshev's Theorem should be used. How many of the graduates would have a starting salary between 19,000 and 31,000?

a. At least 75%.
*b. At least 89%.
c. At least 68%.
d. At least 95%.

General Feedback:
Section 3.3, Difficulty: Hard

54. The ages of students in a class have been put into the frequency distribution below.

Age	Number of Students
18	3
19	5
20	28
21	4

What is the standard deviation for this (population) set of data?

a. 0.494
*b. 0.703
c. 1.12
d. 1.25

General Feedback:
Section 3.3, Difficulty: Hard

55. The ages of students in a class have been put into the frequency distribution below.

Age	Number of Students
18	3
19	5
20	28
21	4

What is the modal age of these students?

a. 18
b. 19
*c. 20
d. 21

General Feedback:
Section 3.3, Difficulty: Easy

56. In its Industry Norms and Key Business Ratios, Dun & Bradstreet reported that Q1, Q2 and Q3 for 577 motorcycle dealers' current ratios were 1.3, 1.6 and 2.9, respectively. From this we can conclude that _____.

a. 68% of these dealers had current ratios between 1.3 and 2.9.
b. 95% of these dealers had current ratios between 1.3 and 2.9.
*c. 50% of these dealers had current ratios between 1.3 and 2.9.
d. 75% of these dealers had current ratios between 1.3 and 2.9.

General Feedback:
Section 3.3, Difficulty: Medium

57. An instructor is evaluating the performance of students on a test. He records the number of points that each student missed and created a frequency distribution. This is provided below:

Points missed	Number of students
0-under 10	2
10-under 20	4
20-under 30	10
30-under 40	8
40-under 50	6

What is the variance for this population?

a. 11.43
b. 135.17
*c. 130.67
d. 200

General Feedback:
section 3.3, Difficulty: Hard

58. An instructor is evaluating the performance of students on a test. He records the number of points that each student missed and created a frequency distribution. This is provided below:

Points missed	Number of students
0-under 10	2
10-under 20	4
20-under 30	10
30-under 40	8
40-under 50	6

What is the standard deviation for this population?

*a. 11.43
b. 14.14

c. 11.63
d. 135.17

General Feedback:
Section 3.3, Difficulty: Hard

59. Which of the following is always true?

a. The median is always one-half of the mean.
b. The mode is always greater than the mean.
c. The mean is always equal to the median.
*d. The standard deviation is always the square root of the variance.

General Feedback:
Section 3.3, Difficulty: Easy

60. Penny Bauer, Chief Financial Officer of Harrison Haulage, suspects irregularities in the payroll system, and orders an inspection of 'each and every payroll voucher issued since 1 January 2003'. Each payroll voucher was inspected and the following frequency distribution was compiled.

Errors Per Voucher	Number of Vouchers
0-under 2	500
2-under 4	400
4-under 6	300
6-under 8	200
8-under 10	100

The distribution of errors per voucher is _____.

*a. symmetrical with respect to its mean
b. skewed to the right
c. not skewed
d. negatively skewed

General Feedback:
Section 3.4, Difficulty: Medium

61. A sales manager has sampled past sales records to determine how many refrigerators are sold each day. Daily records for a sample of 10 days have been selected. The sales on these days are: 0, 4, 3, 2, 1, 3, 5, 5, 2, 5. What is the median daily sales?

a. 3.5
b. 2

*c. 3
d. 4

General Feedback:
Section 3.1, Difficulty: Medium

62. A sales manager has sampled past sales records to determine how many televisions are sold each day. Daily records for a sample of 5 days have been selected. The sales on these days are: 2, 4, 5, 2, 7. What is the mean for this set of data?

a. 2
*b. 4
c. 5
d. 4.5

General Feedback:
Section 3.1, Difficulty: Easy

63. In its Industry Norms and Key Business Ratios, Dun & Bradstreet reported that Q1, Q2 and Q3 for 577 motorcycle dealers' current ratios were 1.3, 1.6 and 2.9, respectively. From this we can conclude that _____.

*a. 50% of these dealers had current ratios of 1.6 or less.
b. 68% of these dealers had current ratios of 1.3 or less.
c. 50% of these dealers had current ratios of 2.9 or more.
d. 95% of these dealers had current ratios of 1.3 or more.

General Feedback:
Section 3.2, Difficulty: Easy

64. A sales manager has sampled past sales records to determine how many televisions are sold each day. Daily records for a sample of 5 days have been selected. The sales on these days are: 2, 4, 5, 2, 7. What is the variance for this set of sample data?

a. 4
*b. 4.5
c. 2
d. 0

General Feedback:
Section 3.2, Difficulty: Medium

65. A sales manager has sampled past sales records to determine how many televisions are sold each day. Daily records for a sample of 5 days have been selected. The sales on these days are: 2, 4, 5, 2, 7. What is the mean absolute deviation for this set of data?

a. 0
b. 2
*c. 1.6
d. 4

General Feedback:
Section 3.3, Difficulty: Medium

66. Libby Cheung manages a portfolio of 250 common stocks. Her staff compiled the following performance statistics for two new stocks.
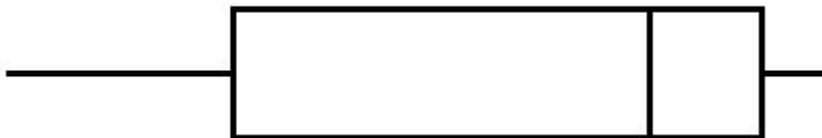
Stock	Rate of Return	
	Mean	Standard Deviation
Salas Products	15%	5%
Hot Boards	20%	5%

The coefficient of variation for Salas Products is _____.

a. 300%.
b. 100%.
*c. 33%.
d. 5%.

General Feedback:
Section 3.3, Difficulty: Easy

67. The following box and whisker plot was constructed for the age of accounts receivable.

The box and whisker plot reveals that the accounts receivable ages are _____.

*a. skewed to the left
b. skewed to the right
c. not skewed
d. normally distributed

General Feedback:
Section 3.4, Difficulty: Easy

68. The following frequency distribution was constructed for the age of accounts receivable.

The frequency distribution reveals that the accounts receivable ages are _____.

a. skewed to the left
*b. skewed to the right
c. not skewed
d. normally distributed

General Feedback:
Section 3.4, Difficulty: Easy

69. David Marshall, Human Resources Manager with Auckland First Bank (AFB), is reviewing the employee training programs of AFBs. His staff compiled the following table of regional statistics on teller training hours.

	Southern Region	Northern Region
Mean	20	28
Median	20	20
Mode	20	21
Standard Deviation	5	7

What can David conclude from these statistics?

a. The southern distribution is skewed to the left.
b. The southern distribution is skewed to the right.
c. The northern distribution is skewed to the left.
*d. The northern distribution is skewed to the right.

General Feedback:
Section 3.4, Difficulty: Medium

70. David Marshall, Human Resources Manager with Auckland First Bank (AFB), is reviewing the employee training programs of AFBs. His staff compiled the following table of regional statistics on teller training hours.

	Southern Region	Northern Region
Mean	20	28
Median	20	20
Mode	20	21
Standard Deviation	5	7

What can David conclude from these statistics?

a. The Northern distribution has the greater relative dispersion.
b. The Northern distribution is skewed to the left.
c. The Southern distribution has the greater relative dispersion.
*d. The Southern distribution is not skewed.

General Feedback:
Section 3.4, Difficulty: Medium

Short Answer/Essay Questions

71. What are measures of central tendency?

Correct Answer:
Section 3.1. Measures of central tendency are used to yield information about the centre, or middle part, of a set of numbers. Measures of central tendency include such concepts as average, mode, median, mean. However, measures of central tendency do not focus on the span of data, or how far values are from the middle numbers.

72. Describe the empirical rule.

Correct Answer:
Section 3.3. The empirical rule is an important rule of thumb that is used to state the approximate percentage of values that lie within a given number of standard deviations from the mean of a set of data if the data are normally or approximately normally distributed. It is used only for three numbers of standard deviations: 1σ, 2σ and 3σ.

73. Describe Chebyshev's Theorem.

Correct Answer:
Section 3.3. The empirical rule applies only when data are known to be approximately normally distributed. However, this is not always the case as data come in many shapes, not just bell shaped. Chebyshev's theorem applies to ALL distributions regardless of their shape, and hence can be used whenever the data distribution shape is unknown or non-normal.

74. What are z-scores?

Correct Answer:
Section 3.3. A z-score represents the number of standard deviations that a value (x) is above or below the mean. By using z-scores, a translation of a value's raw distance from the mean into units of standard deviations is allowed. If a z-score is negative, the raw value (x) is below the mean. If the s-score is positive, the raw value (x) is above the mean.

75. Describe the concept of skewness.

Correct Answer:
Section 3.4. If data is distributed where the right half is a mirror image of the left half, then it is said to be symmetrical, such as in the case of a bell curve. However, data is not always symmetrical, and in this instance is said to be skewed. Data can be skewed to the left (negatively skewed), or to the right (positively skewed). If it is skewed to the left, then the greater number of observations occur in the left tail (and would have negative z-scores), and conversely, if it is skewed to the right, the greater number of observations occur in the right tail (and would have positive z-scores).

76. Describe the concept of correlation.

Correct Answer:
Section 3.5. Correlation is one of many measures of association which can help researchers yield information about the relatedness of numerical values. Correlation is therefore a measure of the degree of relatedness of variable. For sample pairs of data, correlation analysis can yield a numerical value that represents the degree of relatedness between two variables. An example would be if advertisers wish to know the correlation between the size of an advertisement and the number of sales of the product being advertised.

77. The following data reflect water bills for ten households in Sydney in April March.

	$102.88	$111.40		$105.48
$96.20			$86.43	
	$120.46	$121.78		$131.00
$79.90			$93.64	

Determine three measures of central tendency for these sample data.

Correct Answer:
The three measures of central tendency are the mean, median, and mode. These are computed as follows:

(a) Mean:
$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{x} = \frac{1049.17}{10} = \$104.92$$

(b) Median: Arrange the data in order from low to high. Since we have an even number of values, the median is the mean of the 5th and 6th values.
$79.90 $86.43 $93.64 $96.20 $102.88 $105.48 $111.40 $120.46 $121.78 131.00
The median is found as:

$$\text{Md} \approx \frac{\$102.88 + \$105.48}{2} = \$104.18$$

(c) Mode: The mode is the value in the data that occurs most frequently. Since no value in this sample occurs more frequently than one time, there is no mode.

78. In the question above, determine whether the sample data are symmetric or skewed.

Correct Answer:
Data are symmetric if the mean and the median are equal. Since the sample mean = $104.92 and the median equals $104.18 the data are not symmetric. Since the mean is less than median, we conclude that the sample data are left-skewed.

79. A speeding camera caught the following number of speeding cars over a period of ten days. The data were: 13, 21, 12, 34, 31, 13, 22, 26, 25, and 23. What is the standard deviation for the number of speeding cars per day?

Correct Answer:
Section 3.3

$$s^2 = \sum(x-\bar{x})^2/(n-1) = 514/9 = 51.11 \Rightarrow s = 7.56$$

80. In the previous question, what is the inter-quartile range for the number of citations issued per day?

Correct Answer:

a. Section 3.3. Location of Q_3 = 0.75(n+1) = 0.75(11) = 8.25; Value of Q_3 =26+0.25(31-26) =27.25

Location of Q_1 = 0.25(n+1) = 0.25(11) =2.75; Value of Q_1=13+0.75(3-3) =13.0

IQR =Q_3 -Q_1 = 27.25-13.0 =14.25