3.3 Section Exercises

Percentiles

Answer the questions that follow each set of data.

1. The following data represent weights of Yorkshire Terriers (in pounds).

6.8	9.1	8.7	7.5	8.2
5.4	6.5	8.5	7.3	6.6
5.9	7.3	9.3	7.4	7.8

a. Which weight represents the 50^{th} percentile?

b. What is the percentile of a weight of 8.2 pounds?

2. The following data represent high temperatures for cities in the Southeast (in degrees Fahrenheit).

85	82	93	88
92	79	84	90
77	83	91	89
90	85	87	91
89	92	95	88

a. Which temperature represents the 75^{th} percentile?

b. What is the percentile of a temperature of 93 °F?

3. The following data represent average numbers of Tweets per day posted on Twitter for 16 high school students.

0.8	42.2	20.6	2.8
36.7	18.6	23.3	11.5
3.7	14.9	9.4	1.5
14.9	31.1	23.5	9.5

a. Which number represents the 25^{th} percentile?

b. What is the percentile of an average of 11.5 Tweets per day?

4. The following data represent scores on a test given in Mr. Jones's second period algebra class.

51	53	60	62	68	69
70	73	77	77	79	80
82	84	84	89	90	92
92	92	96	97	99	99

a. What test score represents the 40^{th} percentile?

b. What is the percentile of a test score of 92?

Exercises 5–10 reference data sets that are available for download from stat.hawkeslearning.com in Microsoft Excel or Minitab format. The Patient Data are medical statistics for a sample of patients from a hospital. The State Data are measurements collected by the US Census Bureau for each of the 50 states. Use the data sets to answer the following questions.

5. Refer to the Patient Data.

a. Which patient weight represents the 35th percentile?

b. What is the percentile of a weight of 189 pounds?

6. Refer to the State Data.

a. Which population represents the 82nd percentile?

b. What is the percentile of a mean travel time of 27 minutes?

7. What is the 85th percentile for the patients' systolic blood pressure readings from the Patient Data?

8. In the State Data, what is the percentile of Oregon's mean travel time to work, 23.5 minutes?

9. What is the 50th percentile of the patients' ages in the Patient Data?

10. What is the 30th percentile for state populations in the State Data?

Five-Number Summary

Find the five-number summary for each data set. Use the approximation method to calculate quartiles. These values will match those produced by a TI-83/84 Plus calculator.

11. The following data represent prices (in dollars) of used cars listed on www.autotrader.com for one zip code.

18,865	11,442	15,750	10,960	15,635
15,963	13,702	14,788	15,495	8250
	12,900	14,850	6450	

12. The following data represent weights of dimes, measured in grams.

2.268	2.267	2.269	2.268	2.271
2.266	2.267	2.268	2.270	2.272
	2.265	2.269	2.268	

13. The following data represent INR (International Normalized Ratio) readings of patients with blood clotting disorders.

1.5	2.1	1.7	3.5
4.1	1.2	1.7	1.8

14. The following data represent SAT Critical Reading scores for a randomly selected group of high school seniors.

520	750	620	470
520	660	780	580
390	460	660	570
290	500	690	540

15. The following data represent birth weights (in pounds) of eight newborn babies born on the same day at a local hospital.

5.4	6.5	7.8	9.1
9.3	10.1	7.8	9.0

16. The following data represent times, in minutes, taken by students in a physical education class to run/walk two miles.

12.22	12.35	13.45	16.78	19.01
21.34	24.87	25.10	26.93	29.81

17. The following data represent changes in weight, measured in pounds, from the beginning of a new diet to one month later.

–12	–11	–10
–8	–7	–5
–2	0	1
3	4	

18. The following data represent differences in high temperatures, in degrees Fahrenheit, for the same day from one year to the next in nine metropolitan areas.

9	–2	–8
12	15	19
21	–14	–11

Box Plots

Draw a box plot for each set of data on the same graph. Use the approximation method to calculate quartiles. These values will match those produced by a TI-83/84 Plus calculator. Use your box plots to answer the following questions.

a. Which data set has the smallest value?
b. Which data set has the larger median?
c. Which data set has the larger interquartile range?

19. Weight loss (in pounds) from diet A: 2, 3, 5, 5, 5, 6, 6, 6, 7, 7, 8

Weight loss (in pounds) from diet B: 3, 3, 4, 4, 4, 5, 6, 6, 9, 12

20. Respiratory rates at rest (in breaths per minute) of adults in group A:

10, 12, 13, 14, 15, 16, 17, 18

Respiratory rates at rest (in breaths per minute) of adults in group B:

11, 15, 17, 18, 19, 19, 20

21. Test scores for class A: 45, 60, 57, 83, 72, 93, 87, 73, 92

Test scores for class B: 23, 88, 67, 89, 91, 76, 72, 100, 95, 35

22. Diameters of cans (in cm) from assembly line A:

5.6, 5.7, 5.1, 5.7, 5.5, 5.9, 5.7, 5.5, 5.6, 5.6

Diameters of cans (in cm) from assembly line B:

5.4, 5.7, 5.6, 5.5, 5.6, 5.7, 5.7, 5.8, 5.6, 5.5

IQR and Outliers

Answer the following questions regarding interquartile range and outliers.

a. Calculate the IQR.
b. Use the IQR to identify any outliers.

23. The following data set represents the average sailing speed (in knots) for a sample of 15 racing yachts.

9.0	11.6	12.5	12.9	13.1
13.7	14.0	14.3	14.5	15.1
15.3	15.4	15.6	16.1	17.2

24. The following data gives the amount of student loans (in thousands of dollars) held by a group of 20 randomly selected recent college graduates.

0	0	6.7	7.6	8.1
9.9	10.8	17.0	20.5	24.6
25.5	29.3	30.0	34.8	44.5
50.5	65.2	85.2	95.8	102.5

Standard Scores

Calculate the standard score using the given values. Round your answer to two decimal places.

25. $\mu = 25, \quad \sigma = 3, \quad x = 27$

26. $\bar{x} = 37, \quad s = 8, \quad x = 34$

27. $\mu = 0.32, \quad \sigma = 0.01, \quad x = 0.29$

28. $\mu = 2, \quad \sigma = 0.5, \quad x = 1.8$

29. Carlita scored 32 on the ACT Mathematics Test and 730 on the mathematics section of the SAT. If the ACT Mathematics Test had a mean score of 21.0 with a standard deviation of 5.3, and the mathematics section of the SAT had a mean score of 516 with a standard deviation of 116, on which exam did Carlita earn a better math score with respect to her peers?

30. A manufacturer makes aluminum cans and longneck bottles. The average diameter of an aluminum can is supposed to be 4.2 inches, with an allowable standard deviation of 0.01 inches. The average diameter on a longneck bottle is supposed to be 3.8 inches, with an allowable standard deviation of 0.02 inches. A factory worker randomly selects a can from the assembly line and it has a diameter of 4.3 inches. The worker then selects a bottle from the assembly line and it has a diameter of 3.75 inches. Which assembly line is closest to specifications?

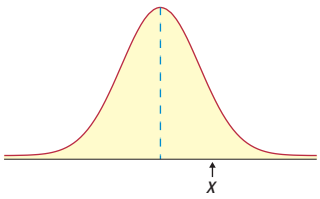
31. Don played in a local golf tournament for charity and scored a round of 63 while the average round for the day was a 74 with a standard deviation of 3 strokes. Later that week, Don played in a Pro-Am tournament and scored a 65 while the average score for the day was a 79 with a standard deviation of 4 strokes. Which was Don's better round of golf in comparison to the competition? (Remember, in golf, lower scores are better!)

32. A large sample of English labrador retrievers has a mean weight of 70.3 pounds with a standard deviation of 4.9 pounds. A similarly large sample of Siberian huskies has a mean weight of 48.8 pounds with a standard deviation of 3.5 pounds. Maggie, an English lab, is 74 pounds and Scout, a Siberian husky, is 52 pounds. Which dog is larger with respect to the average weight of its breed?

For each graph, where the mean is marked by the dotted line, which is a likely z-score for the indicated value of x? Choose from the following z-scores:

a. –1.3 b. 0 c. 1.7 d. 2.8

33.



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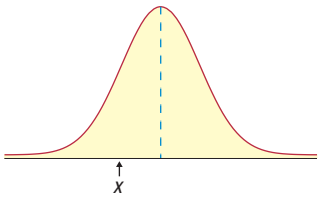

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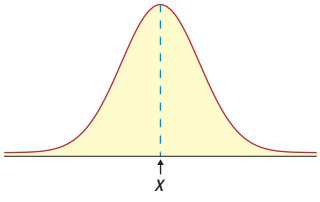

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