SECTION 1.3 Exercises

79. **Quiz grades** Joey's first 14 quiz grades in a marking period were

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86	84	91	75	78	80	74
87	76	96	82	90	98	93

Calculate the mean. Show your work. Interpret your result in context.

80. **Cowboys** The 2009 roster of the Dallas Cowboys professional football team included 7 defensive linemen. Their weights (in pounds) were 306, 305, 315, 303, 318, 309, and 285. Calculate the mean. Show your work. Interpret your result in context.

81. **Quiz grades** Refer to Exercise 79.

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(a) Find the median by hand. Show your work. Interpret your result in context.

(b) Suppose Joey has an unexcused absence for the 15th quiz, and he receives a score of zero. Recalculate the mean and the median. What property of measures of center does this illustrate?

82. **Cowboys** Refer to Exercise 80.

(a) Find the median by hand. Show your work. Interpret your result in context.

(b) Suppose the lightest lineman had weighed 265 pounds instead of 285 pounds. How would this change affect the mean and the median? What property of measures of center does this illustrate?

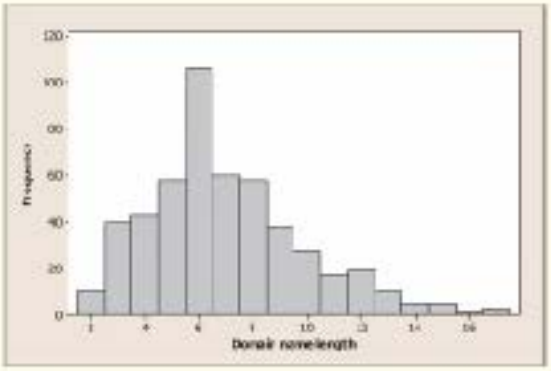
83. **Incomes of college grads** According to the Census Bureau, the mean and median 2008 income of people at least 25 years old who had a bachelor's degree but no higher degree were $48,097 and $60,954. Which of these numbers is the mean and which is the median? Explain your reasoning.

84. **House prices** The mean and median selling prices of existing single-family homes sold in November 2009 were $216,400 and $172,600.[41] Which of these numbers is the mean and which is the median? Explain how you know.

85. **Baseball salaries** Suppose that a Major League Baseball team's mean yearly salary for its players is $1.2 million and that the team has 25 players on its active roster. What is the team's total annual payroll? If you knew only the median salary, would you be able to answer this question? Why or why not?

86. **Mean salary?** Last year a small accounting firm paid each of its five clerks $22,000, two junior accountants $50,000 each, and the firm's owner $270,000. What is the mean salary paid at this firm? How many of the employees earn less than the mean? What is the median salary? Write a sentence to describe how an unethical recruiter could use statistics to mislead prospective employees.

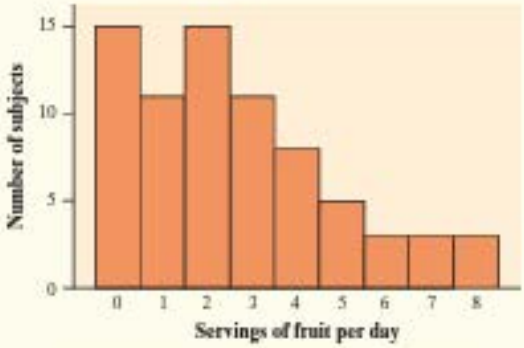
87. **Domain names** When it comes to Internet domain names, is shorter better? According to one ranking of Web sites in 2008, the top 8 sites (by number of "hits") were yahoo.com, google.com, youtube.com, live.com, msn.com, myspace.com, wikipedia.org, and facebook.com. These familiar sites certainly have short domain names. The histogram below shows the domain name lengths (in number of letters in the name, not including the extensions .com and .org) for the 500 most popular Web sites.



(a) Estimate the mean and median of the distribution. Explain your method clearly.

(b) If you wanted to argue that shorter domain names were more popular, which measure of center would you choose—the mean or the median? Justify your answer.

88. **Do adolescent girls eat fruit?** We all know that fruit is good for us. Below is a histogram of the number of servings of fruit per day claimed by 74 seventeen-year-old girls in a study in Pennsylvania.[42]



(a) With a little care, you can find the median and the quartiles from the histogram. What are these numbers? How did you find them?

(b) Estimate the mean of the distribution. Explain your method clearly.

89. **Quiz grades** Refer to Exercise 79.

(a) Find and interpret the interquartile range (*IQR*).

(b) Determine whether there are any outliers. Show your work.

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90. **Cowboys** Refer to Exercise 80.

(a) Find and interpret the interquartile range (*IQR*).

(b) Determine whether there are any outliers. Show your work.

91. **Don't call me** In a September 28, 2008, article titled "Letting Our Fingers Do the Talking," the *New York Times* reported that Americans now send more text messages than they make phone calls. According to a study by Nielsen Mobile, "Teenagers ages 13 to 17 are by far the most prolific texters, sending or receiving 1,742 messages a month." Mr. Williams, a high school statistics teacher, was skeptical about the claims in the article. So he collected data from his first-period statistics class on the number of text messages and calls they had sent or received in the past 24 hours. Here are the texting data:

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0	7	1	29	25	8	5	1	25	98	9	0	26
8	118	72	0	92	52	14	3	3	44	5	42	

(a) Make a boxplot of these data by hand. Be sure to check for outliers.

(b) Do these data support the claim in the article about the number of texts sent by teens? Justify your answer with appropriate evidence.

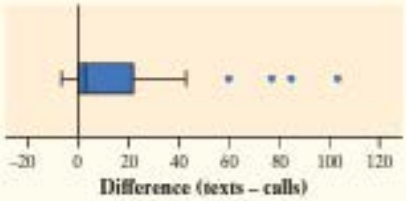
92. **Acing the first test** Here are the scores of Mrs. Liao's students on their first statistics test:

93	93	87.5	91	94.5	72	96	95	93.5	93.5	73
82	45	88	80	86	85.5	87.5	81	78	86	89
92	91	98	85	82.5	88	94.5	43			

(a) Make a boxplot of the test score data by hand. Be sure to check for outliers.

(b) How did the students do on Mrs. Liao's first test? Justify your answer.

93. **Texts or calls?** Refer to Exercise 91. A boxplot of the difference (texts – calls) in the number of texts and calls for each student is shown below.



(a) Do these data support the claim in the article about texting versus calling? Justify your answer with appropriate evidence.

(b) Can we draw any conclusion about the preferences of all students in the school based on the data from Mr. Williams's statistics class? Why or why not?

94. **Electoral votes** To become president of the United States, a candidate does not have to receive a majority of the popular vote. The candidate does have to win a majority of the 538 electoral votes that are cast in the Electoral College. Here is a stemplot of the number of electoral votes for each of the 50 states and the District of Columbia.

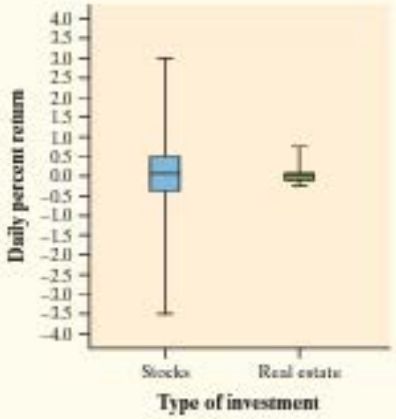
0	3333333344444
0	55555666777788999
1	0000111123
1	5557
2	011
2	7
3	14
3	
4	
4	
5	
5	5

Key: 1|5 is a state with 15 electoral votes.

(a) Make a boxplot of these data by hand. Be sure to check for outliers.

(b) Which measure of center and spread would you use to summarize the distribution—the mean and standard deviation or the median and *IQR*? Justify your answer.

95. **Comparing investments** Should you put your money into a fund that buys stocks or a fund that invests in real estate? The boxplots compare the daily returns (in percent) on a "total stock market" fund and a real estate fund over a year ending in November 2007.[43]

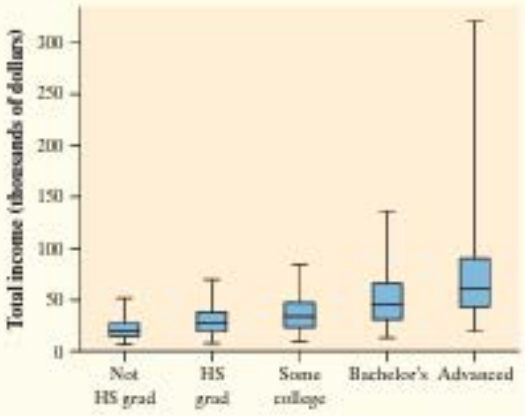


(a) Read the graph: about what were the highest and lowest daily returns on the stock fund?

(b) Read the graph: the median return was about the same on both investments. About what was the median return?

(c) What is the most important difference between the two distributions?

96. **Income and education level** Each March, the Bureau of Labor Statistics compiles an Annual Demographic Supplement to its monthly Current Population Survey.[44] Data on about 71,067 individuals between the ages of 25 and 64 who were employed full-time were collected in one of these surveys. The boxplots below compare the distributions of income for people with five levels of education. This figure is a variation of the boxplot idea: because large data sets often contain very extreme observations, we omitted the individuals in each category with the top 5% and bottom 5% of incomes. Write a brief description of how the distribution of income changes with the highest level of education reached. Give specifics from the graphs to support your statements.



97. **Phosphate levels** The level of various substances in the blood influences our health. Here are measurements of the level of phosphate in the blood of a patient, in milligrams of phosphate per deciliter of blood, made on 6 consecutive visits to a clinic: 5.6, 5.2, 4.6, 4.9, 5.7, 6.4. A graph of only 6 observations gives little information, so we proceed to compute the mean and standard deviation.

(a) Find the standard deviation from its definition. That is, find the deviations of each observation from the mean, square the deviations, then obtain the variance and the standard deviation.

(b) Interpret the value of s_x you obtained in (a).

98. **Feeling sleepy?** The first four students to arrive for a first-period statistics class were asked how much sleep (to the nearest hour) they got last night. Their responses were 7, 7, 9, and 9.

(a) Find the standard deviation from its definition. That is, find the deviations of each observation from the mean, square the deviations, then obtain the variance and the standard deviation.

(b) Interpret the value of s_x you obtained in (a).

(c) Do you think it's safe to conclude that the mean amount of sleep for all 30 students in this class is close to 8 hours? Why or why not?

99. **Shopping spree** The figure displays computer output from Data Desk for data on the amount spent by 50 grocery shoppers.

(a) What would you guess is the shape of the distribution based only on the computer output? Explain.

(b) Interpret the value of the standard deviation.

(c) Are there any outliers? Justify your answer.

100. **C-sections** Do male doctors perform more cesarean sections (C-sections) than female doctors? A study in Switzerland examined the number of cesarean sections (surgical deliveries of babies) performed in a