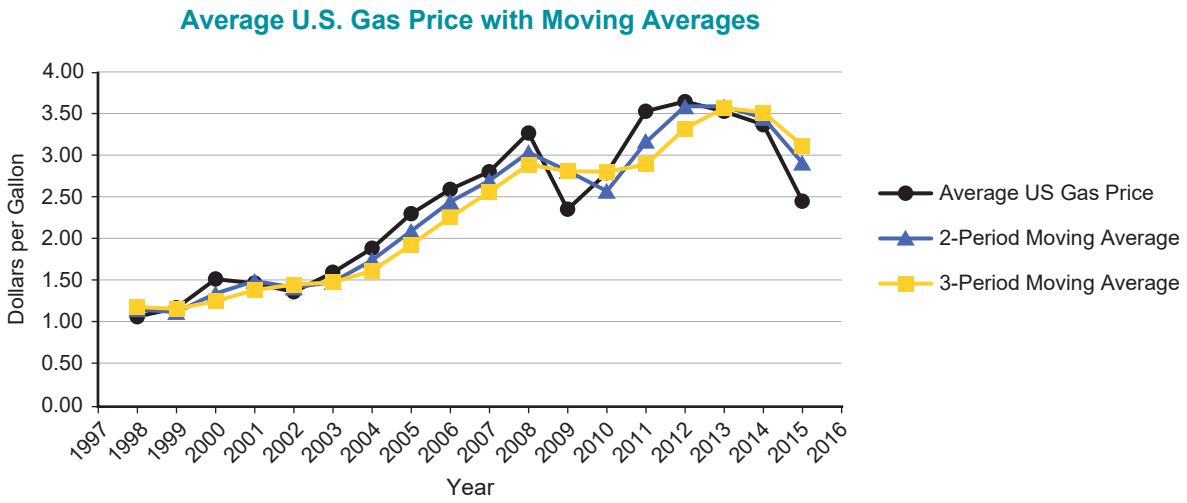

Figure 4.1.10

4.1 Exercises

Basic Concepts

1. Describe the difference between statistics and parameters.
2. Discuss three major attributes used in summarizing a data set.
3. What are numerical descriptive statistics and why are they important?
4. Identify and describe five measures of location. List the advantages and disadvantages of each.
5. List the types of data that are appropriate for each of the measures of location discussed in the previous question.
6. Why is the mean a measure of central tendency?
7. What is a resistant measure?
8. Describe a situation in which using the weighted mean as a measure of location would be appropriate.
9. What does it mean if we say that a data set is positively skewed? Negatively skewed?
10. Explain why the mean should not be calculated for a nonstationary time series.
11. What is a moving average? When is it useful?

Exercises

12. The data in the table below represent the percentage growth of assets 20 years after the initial investment. Calculate the mean, median, 10% trimmed mean, and mode for percentage growth.

Percentage Growth of Assets									
90.25	93.83	91.41	92.27	90.89	99.12	92.88	97.74	96.28	95.33
91.16	94.30	95.51	92.27	97.63	95.94	90.95	94.76	92.27	92.88

13. A survey was taken of customers asking what percentage above wholesale price would they be willing to pay for a product considered to be a necessity. Calculate the mean, median, 20% trimmed mean, and mode for the percentage above wholesale price that the randomly selected customers are willing to pay.

Percentage Above Wholesale Price							
19	14	11	11	18	20	10	15
20	10	19	11	18	18	11	

14. Calculate the mean, median, 10% trimmed mean, and mode for the following data on the number of cars in line at noon at a favorite fast-food restaurant on 10 consecutive days.

Number of Cars in Line									
2	22	6	18	10	14	12	12	16	8

15. Discuss the usefulness of each of the measures of central tendency with respect to the following situations.

- **a.** A company is considering a move into a regional market for specialty soft drinks. In analyzing the size containers that his competitors are currently offering, would the company be more interested in the mean, median, or mode of their containers?
- **b.** The creative director for an advertising agency is trying to target an ad campaign that will be shown in one city only. Would he be more interested in the mean or median family income in the city?
- **c.** A young economist was assigned the task of comparing the interest rates of ninety-day certificates of deposit (CDs) in three major cities. Should she compare the mean, median, or modal interest for the banks in the three cities?
- **d.** A telephone company is interested in knowing how customers rate their service: excellent, good, average, or poor. Would the company be more interested in studying the mean, median, or mode of the customer service ratings?

16. Discuss the usefulness of each of the measures of central tendency with respect to the following situations.

- **a.** A doctor is interested in analyzing the increase in systolic blood pressure caused by a certain antibiotic. Would the manufacturer be more interested in the mean, median, or mode of the ratings?
- **b.** A car manufacturer is trying to decide in what colors it should offer its new sports coupe. In analyzing the preferred colors of other sports coupes, would the manufacturer be more interested in the mean, median, or mode of the colors?
- **c.** A manufacturer of chocolate bars is interested in knowing how people rate its chocolate: the best, above average, average, below average, or the worst. Would the company be more interested in the mean, median, or mode of the ratings?
- **d.** A realtor is interested in studying the prices of recent home sales in an area which has many diverse neighborhoods. Would the mean, median, or mode of the prices of recent home sales be the best measure of central tendency?

17. The following table contains the daily high temperatures for a southern city in July (measured in degrees Fahrenheit).

High Temperatures in July (°F)									
84	85	84	88	94	100	97	102	97	89
89	90	88	95	91	95	99	93	97	99
90	94	90	88	91	88	106	99	102	85

a. Calculate the mean of the daily high temperatures.

b. Calculate the median of the daily high temperatures.

c. Calculate the mode of the daily high temperatures.

d. Calculate the 10% trimmed mean of the daily high temperatures.

e. Which measure of central tendency do you think best describes the center of the data set? Why?

18. A tour guide informs his group that the "average" temperature at their destination is 60 degrees Fahrenheit. Once they arrive, they discover that the daytime highs are about 120 degrees Fahrenheit and the nighttime lows are about 0 degrees Fahrenheit. Do you feel the tour guide accurately described the temperatures to the group? Discuss.

19. A worker is participating in a test on a new machine. Her daily production, measured in numbers of units, for the twenty-day test is listed in the following table. On days 4 and 5, the worker was ill and went home shortly after coming to work.

Daily Production										
Day	1	2	3	4	5	6	7	8	9	10
Units	100	104	117	20	20	111	105	106	115	101
Day	11	12	13	14	15	16	17	18	19	20
Units	101	102	115	116	113	103	104	119	118	108

a. What level of measurement does the data possess?

b. Compute the 10% trimmed mean and the 20% trimmed mean.

c. Considering the worker's illness, which measure computed in part **b.** best describes the production capability of the machine? Discuss.

20. Consider the following per capita greenhouse emissions (in tons of carbon dioxide equivalent per capita) for 10 randomly selected states.

Greenhouse Emissions per Capita (Tons)				
11.76	15.65	22.93	24.75	21.22
18.72	22.55	27.99	12.23	114.40

a. What level of measurement do the data possess?

b. Compute the 10% trimmed mean and the 20% trimmed mean.

c. Considering the data, which measure computed in part **b.** best describes the per capita greenhouse emissions? Discuss.

21. Consider the following monthly sales for a small clothing store in a resort community.

Clothing Store Sales			
Month	**Sales ($)**	**Month**	**Sales ($)**
January	100,500	July	200,000
February	120,000	August	185,000
March	133,000	September	175,000
April	145,000	October	120,000
May	160,000	November	180,000
June	180,000	December	330,000

a. Draw a line graph of the data.

b. Calculate the two-period moving averages for the data.

c. Calculate the three-period moving averages for the data.

d. Add line graphs for the two-period moving averages and three-period moving averages to the graph which you constructed in part **a.**

e. Which series of data (the original sales data, the two-period moving averages, or the three-period moving averages) do you think best represents sales for the year? Why?

22. Late in the summer of 1996, Tiger Woods became a professional golfer. This highly publicized event followed a sensational college career at Stanford University, where Tiger won three United States Amateur championships. Tiger was not a professional very long before he had his first win on the pro tour, the Las Vegas Invitational. He received a total of $297,000 for his accomplishment. Since becoming a professional, Tiger has won more than 82 times and has surmassed a net worth of more than $1 billion. The table below contains the prize money (in millions, US dollars) that Tiger has won on the golf course each year from 1996 through 2016.

Career Earnings of Tiger Woods from 1996 to 2016 (in Million U.S. Dollars)			
Year	**On Course**	**Year**	**On Course**
1996	0.89	2007	22.9
1997	2.38	2008	7.74
1998	2.93	2009	21.02
1999	7.68	2010	2.29
2000	11.03	2011	2.07
2001	7.77	2012	9.12
2002	8.29	2013	12.09
2003	6.7	2014	0.61
2004	6.37	2015	0.55
2005	11.99	2016	0.11
2006	11.94		

a. Find the mean.

b. Find the median.

c. Find the mode.

d. Find the 10% trimmed mean and compare it to the mean and the median.

e. Comment on the skewness of the distribution.