

# SOLUTIONS MANUAL

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Appendices use  
Microsoft® Excel 2007

## STATISTICS FOR BUSINESS AND ECONOMICS



ANDERSON  
SWEENEY  
WILLIAMS

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# Chapter 2

## Descriptive Statistics: Tabular and Graphical Presentations

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### Learning Objectives

1. Learn how to construct and interpret summarization procedures for qualitative data such as : frequency and relative frequency distributions, bar graphs and pie charts.
2. Learn how to construct and interpret tabular summarization procedures for quantitative data such as: frequency and relative frequency distributions, cumulative frequency and cumulative relative frequency distributions.
3. Learn how to construct a dot plot, a histogram, and an ogive as graphical summaries of quantitative data.
4. Learn how the shape of a data distribution is revealed by a histogram. Learn how to recognize when a data distribution is negatively skewed, symmetric, and positively skewed.
5. Be able to use and interpret the exploratory data analysis technique of a stem-and-leaf display.
6. Learn how to construct and interpret cross tabulations and scatter diagrams of bivariate data.

Chapter 2

**Solutions:**

1.

Class	Frequency	Relative Frequency
A	60	$60/120 = 0.50$
B	24	$24/120 = 0.20$
C	<u>36</u>	$36/120 = \underline{0.30}$
	120	1.00

2. a.  $1 - (.22 + .18 + .40) = .20$

b.  $.20(200) = 40$

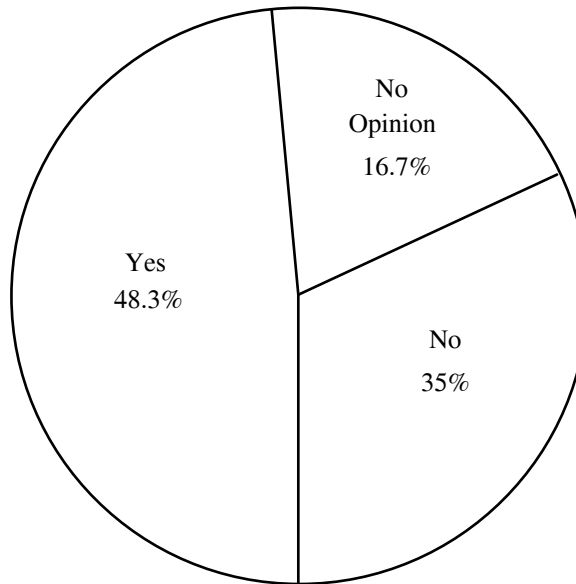
c/d.

Class	Frequency	Percent Frequency
A	$.22(200) = 44$	22
B	$.18(200) = 36$	18
C	$.40(200) = 80$	40
D	$.20(200) = \underline{40}$	<u>20</u>
Total	200	100

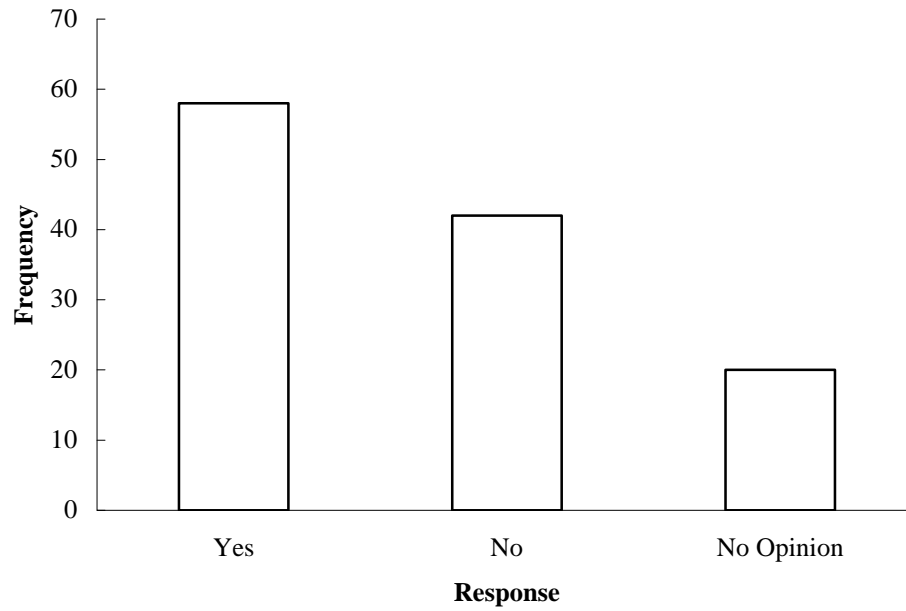
3. a.  $360^\circ \times 58/120 = 174^\circ$

b.  $360^\circ \times 42/120 = 126^\circ$

c.



d.



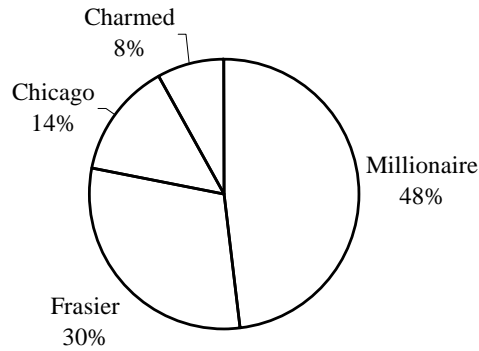
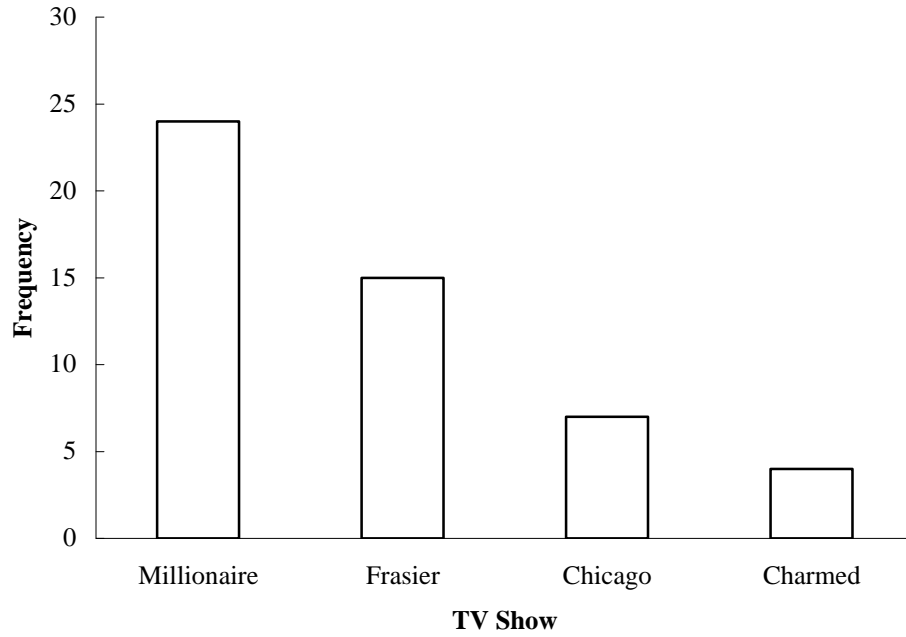
4. a. The data are qualitative.

b.

TV Show	Frequency	Percent Frequency
Millionaire	24	48
Frasier	15	30
Chicago Hope	7	14
Charmed	4	8
Total:	50	100

Chapter 2

c.

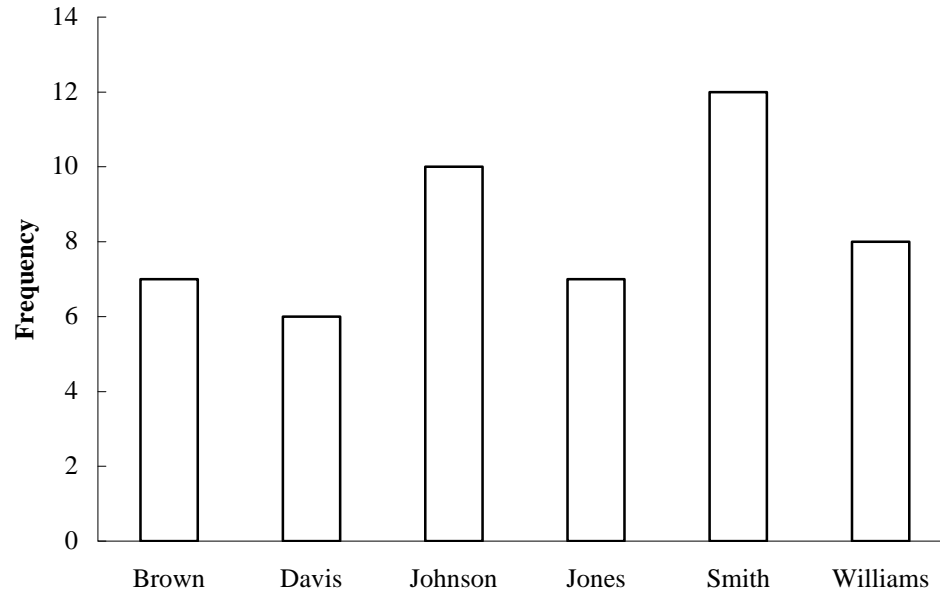


d. Millionaire has the largest market share. Frasier is second.

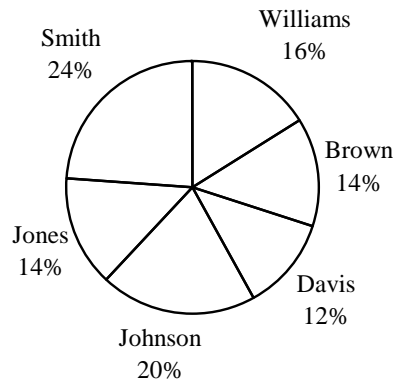
5. a.

Name	Frequency	Relative Frequency	Percent Frequency
Brown	7	.14	14%
Davis	6	.12	12%
Johnson	10	.20	20%
Jones	7	.14	14%
Smith	12	.24	24%
Williams	<u>8</u>	<u>.16</u>	16%
	50	1.00	

b.



- c.
- Brown  $.14 \times 360 = 50.4^\circ$
  - Davis  $.12 \times 360 = 43.2^\circ$
  - Johnson  $.20 \times 360 = 72.0^\circ$
  - Jones  $.14 \times 360 = 50.4^\circ$
  - Smith  $.24 \times 360 = 86.4^\circ$
  - Williams  $.16 \times 360 = 57.6^\circ$



d. Most common: Smith, Johnson and Williams

6. a.

Book	Frequency	Percent Frequency
7 Habits	10	16.66
Millionaire	16	26.67
Motley	9	15.00
Dad	13	21.67
WSJ Guide	6	10.00
Other	6	10.00
Total:	60	100.00

Chapter 2

*The Ernst & Young Tax Guide 2000* with a frequency of 3, *Investing for Dummies* with a frequency of 2, and *What Color is Your Parachute? 2000* with a frequency of 1 are grouped in the "Other" category.

- b. The rank order from first to fifth is: *Millionaire, Dad, 7 Habits, Motley, and WSJ Guide.*
- c. The percent of sales represented by *The Millionaire Next Door* and *Rich Dad, Poor Dad* is 48.33%.

7.

Rating	Frequency	Relative Frequency
Outstanding	19	0.38
Very Good	13	0.26
Good	10	0.20
Average	6	0.12
Poor	<u>2</u>	<u>0.04</u>
	50	1.00

Management should be pleased with these results. 64% of the ratings are very good to outstanding. 84% of the ratings are good or better. Comparing these ratings with previous results will show whether or not the restaurant is making improvements in its ratings of food quality.

8. a.

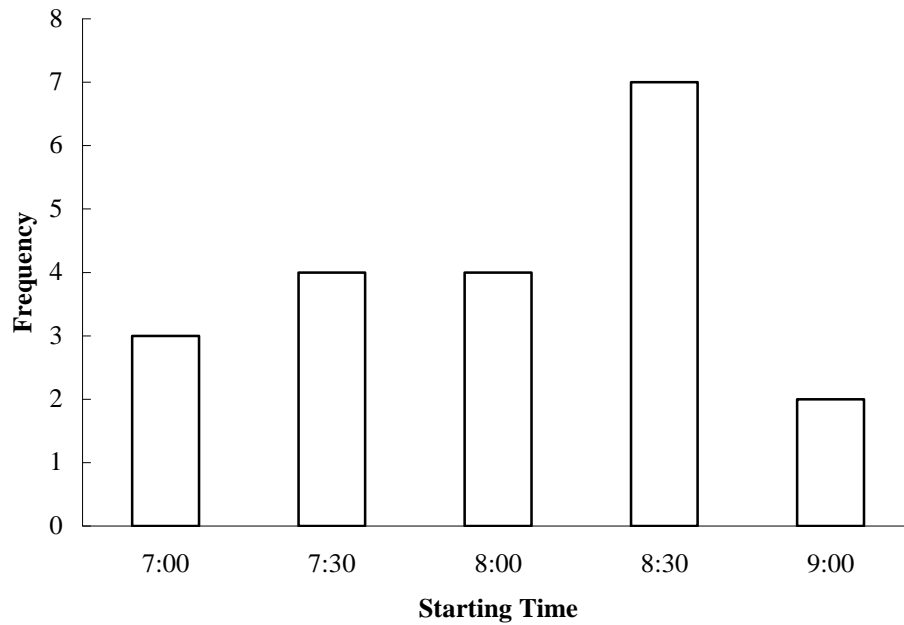
Position	Frequency	Relative Frequency
Pitcher	17	0.309
Catcher	4	0.073
1st Base	5	0.091
2nd Base	4	0.073
3rd Base	2	0.036
Shortstop	5	0.091
Left Field	6	0.109
Center Field	5	0.091
Right Field	<u>7</u>	<u>0.127</u>
	55	1.000

- b. Pitchers (Almost 31%)
- c. 3rd Base (3 - 4%)
- d. Right Field (Almost 13%)
- e. Infielders (16 or 29.1%) to Outfielders (18 or 32.7%)

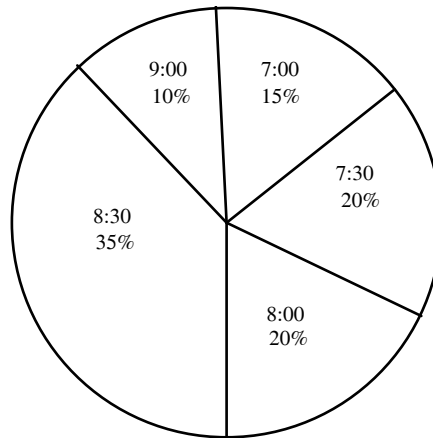
9. a/b.

Starting Time	Frequency	Percent Frequency
7:00	3	15
7:30	4	20
8:00	4	20
8:30	7	35
9:00	<u>2</u>	<u>10</u>
	20	100

c. Bar Graph



d.



e. The most preferred starting time is 8:30 a.m.. Starting times of 7:30 and 8:00 a.m. are next.

10. a. The data refer to quality levels from 1 "Not at all Satisfied" to 7 "Extremely Satisfied."

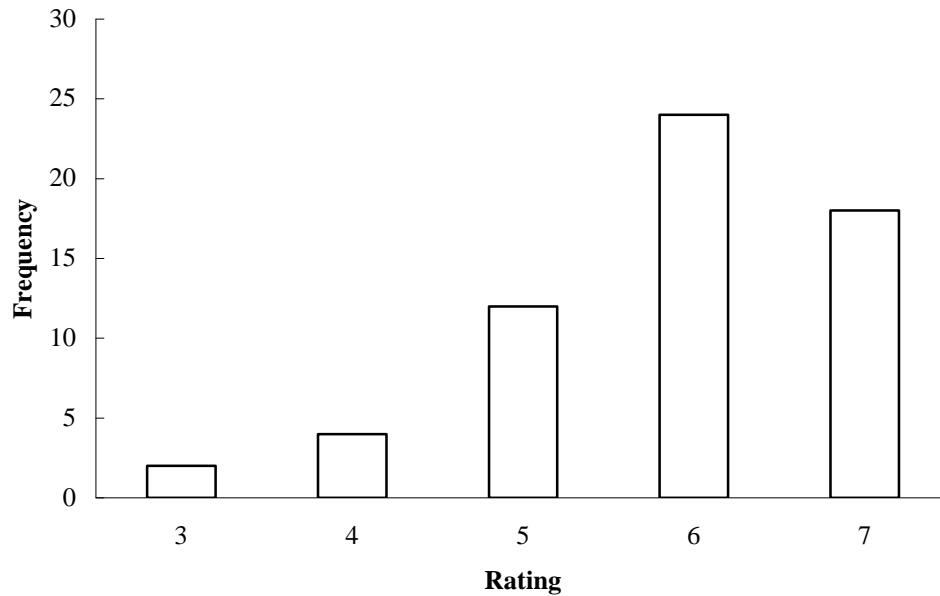
b.

Rating	Frequency	Relative Frequency
3	2	0.03
4	4	0.07
5	12	0.20
6	24	0.40
7	<u>18</u>	<u>0.30</u>
	60	1.00



Chapter 2

c. Bar Graph



d. The survey data indicate a high quality of service by the financial consultant. The most common ratings are 6 and 7 (70%) where 7 is extremely satisfied. Only 2 ratings are below the middle scale value of 4. There are no "Not at all Satisfied" ratings.

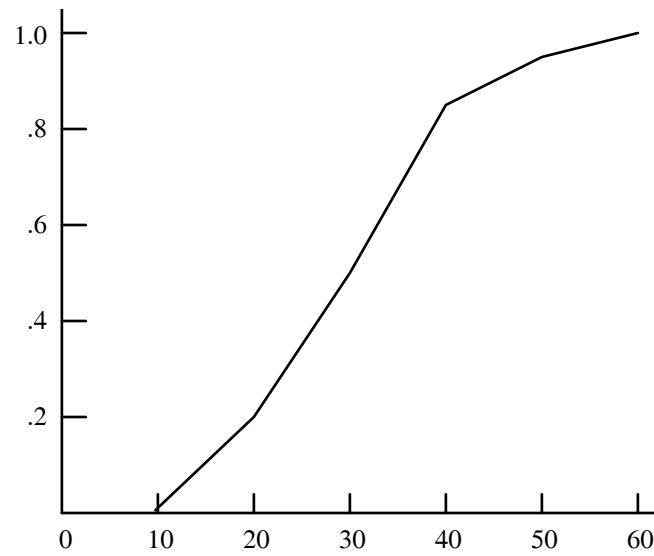
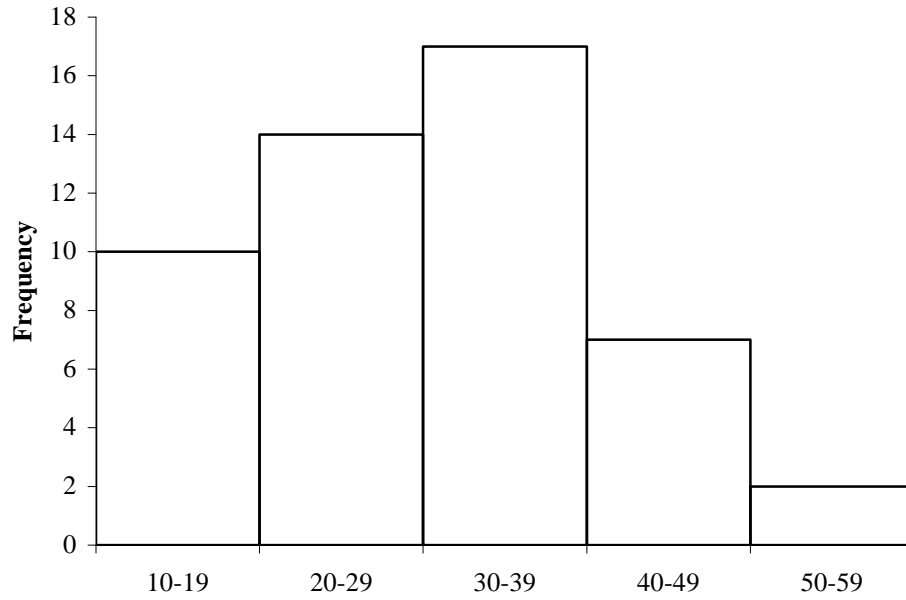
11.

Class	Frequency	Relative Frequency	Percent Frequency
12-14	2	0.050	5.0
15-17	8	0.200	20.0
18-20	11	0.275	27.5
21-23	10	0.250	25.5
24-26	<u>9</u>	<u>0.225</u>	<u>22.5</u>
Total	40	1.000	100.0

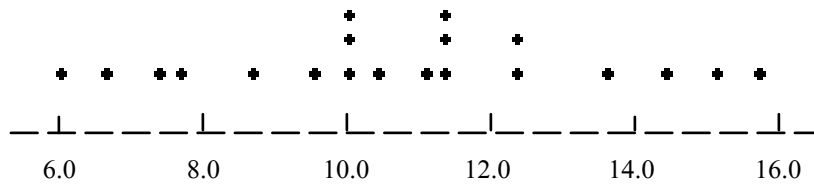
12.

Class	Cumulative Frequency	Cumulative Relative Frequency
less than or equal to 19	10	.20
less than or equal to 29	24	.48
less than or equal to 39	41	.82
less than or equal to 49	48	.96
less than or equal to 59	50	1.00

13.



14. a.



Chapter 2

b/c.

Class	Frequency	Percent Frequency
6.0 - 7.9	4	20
8.0 - 9.9	2	10
10.0 - 11.9	8	40
12.0 - 13.9	3	15
14.0 - 15.9	<u>3</u>	<u>15</u>
	20	100

15. a/b.

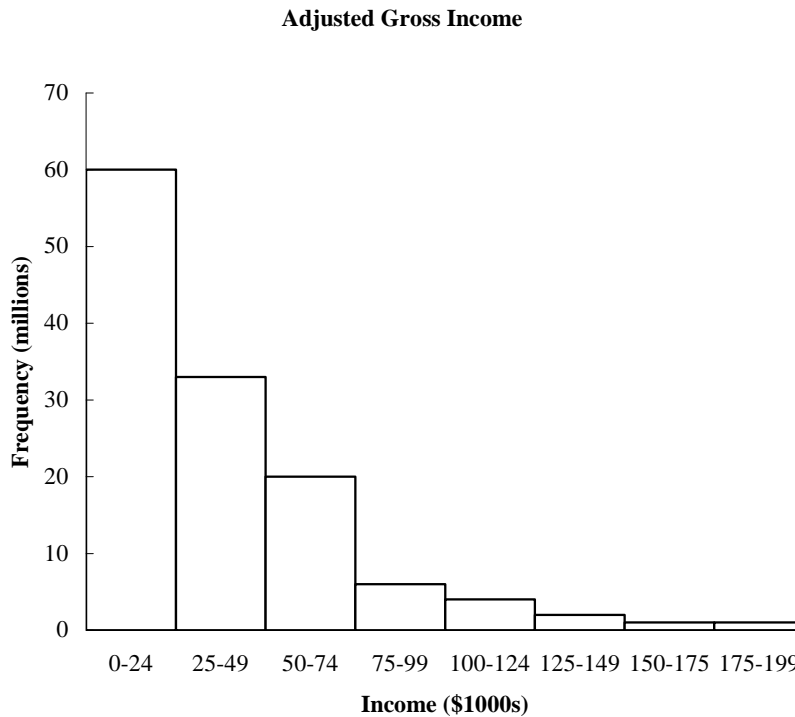
Waiting Time	Frequency	Relative Frequency
0 - 4	4	0.20
5 - 9	8	0.40
10 - 14	5	0.25
15 - 19	2	0.10
20 - 24	<u>1</u>	<u>0.05</u>
Totals	20	1.00

c/d.

Waiting Time	Cumulative Frequency	Cumulative Relative Frequency
Less than or equal to 4	4	0.20
Less than or equal to 9	12	0.60
Less than or equal to 14	17	0.85
Less than or equal to 19	19	0.95
Less than or equal to 24	20	1.00

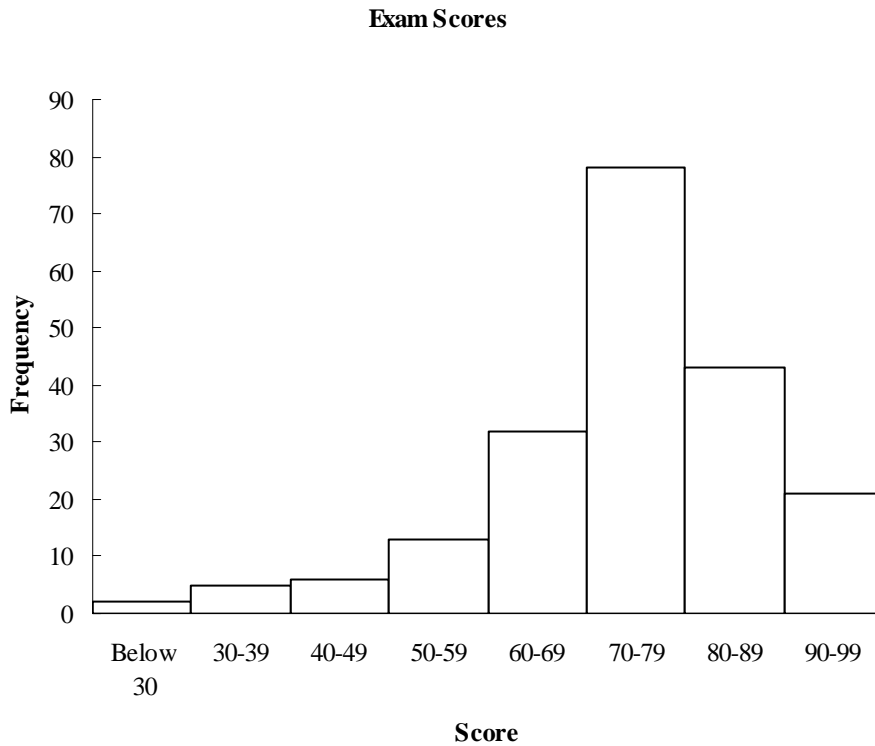
e.  $12/20 = 0.60$

16. a. The histogram is shown below.



The histogram clearly shows that the annual adjusted gross incomes are skewed to the right. And, of course, if annual gross incomes are skewed to the right, so are annual incomes. This makes sense because the vast majority of annual incomes are less than \$100,000. But, there are a few individuals with very large incomes.

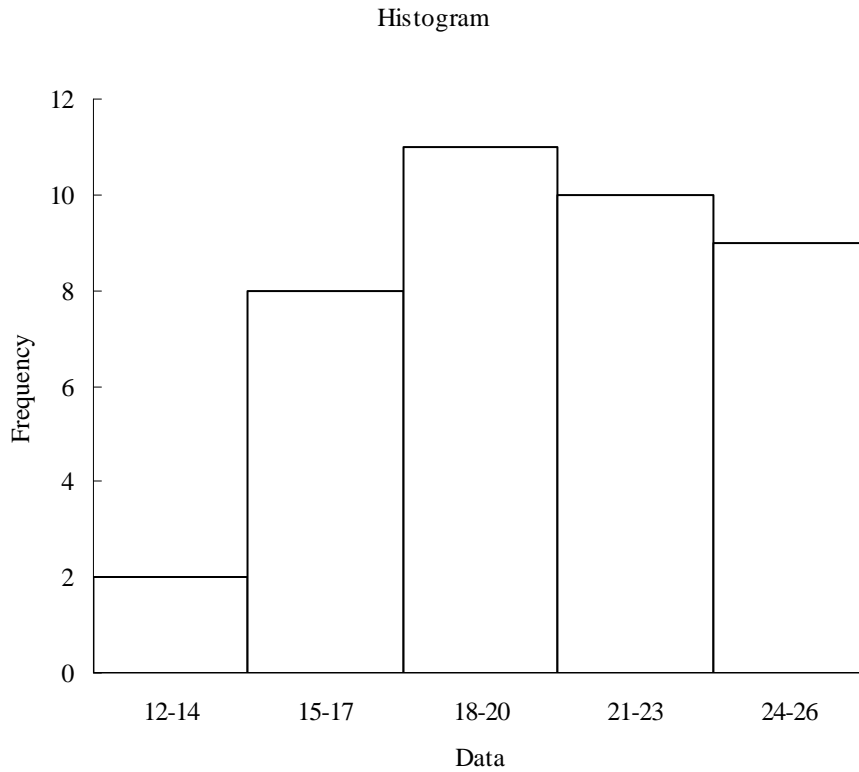
- b. The histogram for the exam scores is given.



The histogram shows that the distribution of exam scores is skewed to the left. This is to be expected. It is our experience that there are frequently a few very low scores causing such a pattern to appear.

Chapter 2

- c. The histogram for the data in Exercise 11 is given.

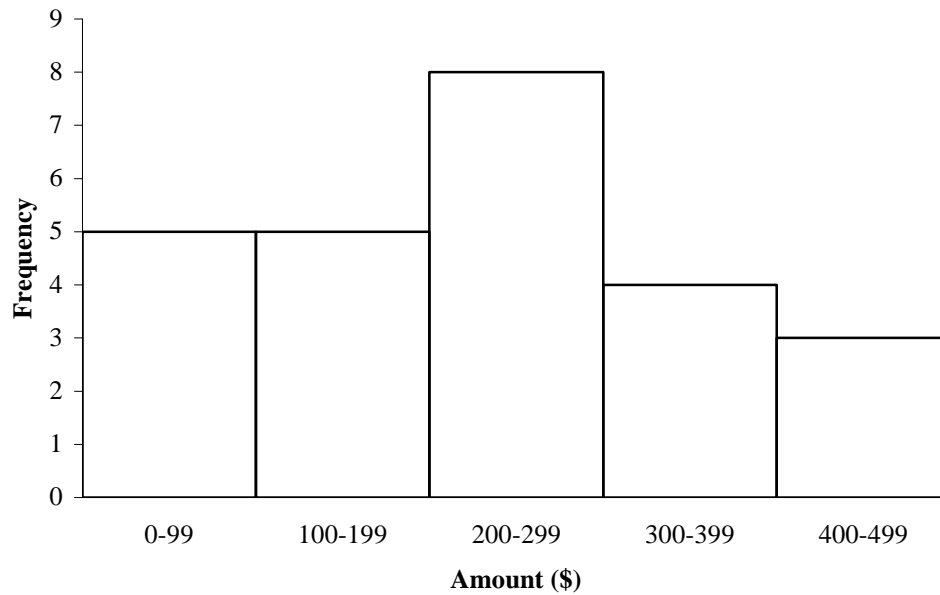


This histogram is skewed to the left slightly, but we would probably classify it as roughly symmetric.

17. a.

Amount	Frequency	Relative Frequency
0-99	5	.20
100-199	5	.20
200-299	8	.32
300-399	4	.16
400-499	3	.12
	25	1.00

b. Histogram



The distribution has a roughly symmetric shape.

- c. The largest group spends \$200-\$299 per year on books and magazines. There are more in the \$0 to \$199 range than in the \$300 to \$499 range.

18. a. Lowest salary: \$93,000  
Highest salary: \$178,000

b.

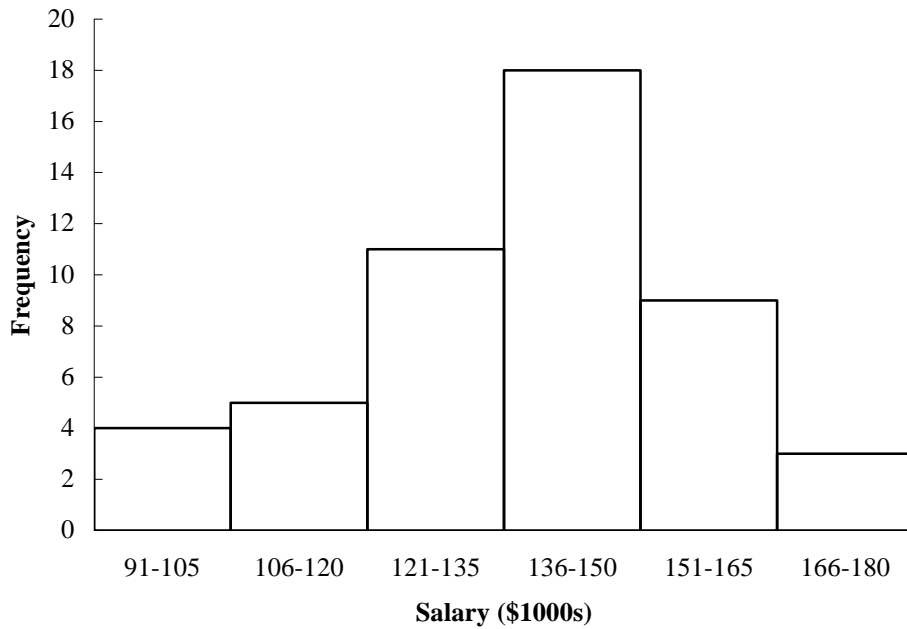
Salary (\$1000s)	Frequency	Relative Frequency	Percent Frequency
91-105	4	0.08	8
106-120	5	0.10	10
121-135	11	0.22	22
136-150	18	0.36	36
151-165	9	0.18	18
166-180	3	0.06	6
Total	50	1.00	100

- c. Proportion \$135,000 or less: 20/50.  
d. Percentage *more than* \$150,000: 24%

Chapter 2

e.

The distribution is skewed slightly to the left, but is roughly symmetric.



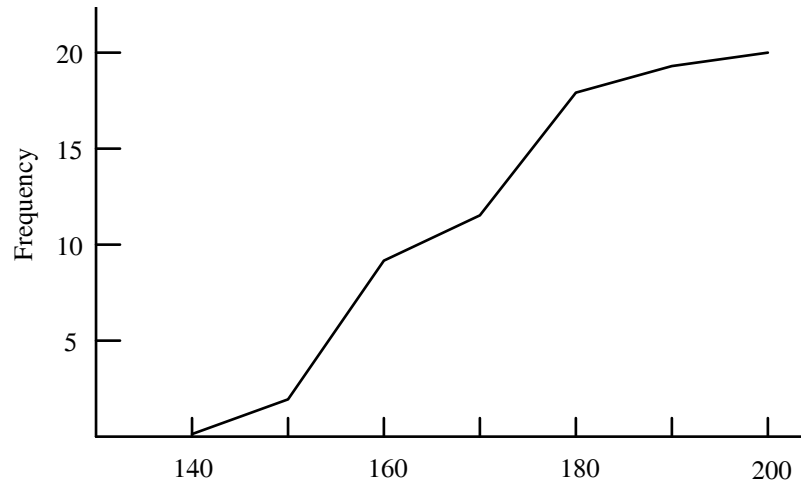
19. a/b.

Number	Frequency	Relative Frequency
140 - 149	2	0.10
150 - 159	7	0.35
160 - 169	3	0.15
170 - 179	6	0.30
180 - 189	1	0.05
190 - 199	<u>1</u>	<u>0.05</u>
Totals	20	1.00

c/d.

Number	Cumulative Frequency	Cumulative Relative Frequency
Less than or equal to 149	2	0.10
Less than or equal to 159	9	0.45
Less than or equal to 169	12	0.60
Less than or equal to 179	18	0.90
Less than or equal to 189	19	0.95
Less than or equal to 199	20	1.00

e.



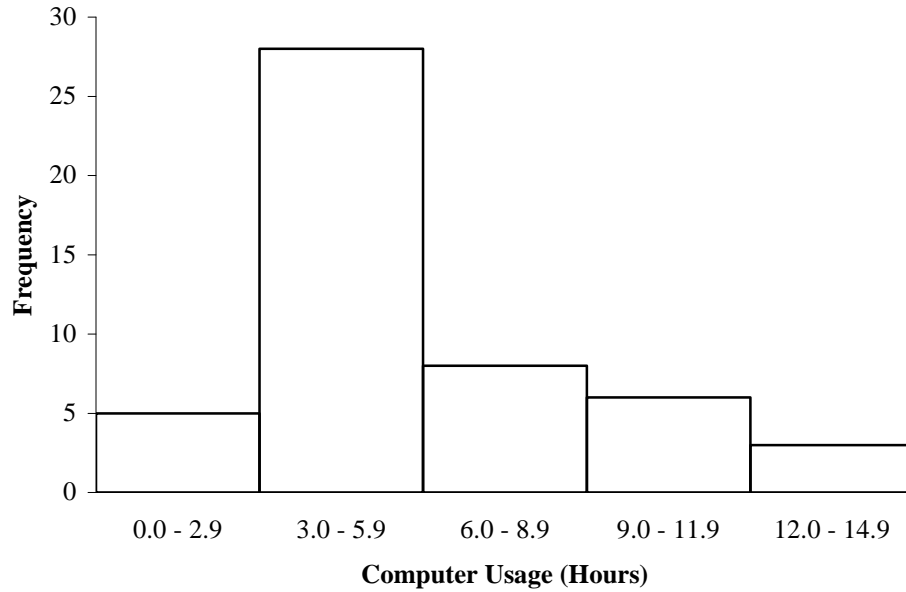
20. a. The percentage of people 34 or less is  $20.0 + 5.7 + 9.6 + 13.6 = 48.9$ .
- b. The percentage of the population over 34 years old is  $16.3 + 13.5 + 8.7 + 12.6 = 51.1$
- c. The percentage of the population that is between 25 and 54 years old inclusively is  $13.6 + 16.3 + 13.5 = 43.4$
- d. The percentage less than 25 years old is  $20.0 + 5.7 + 9.6 = 35.3$ .  
So there are  $(.353)(275) = 97.075$  million people less than 25 years old.
- e. An estimate of the number of retired people is  $(.5)(.087)(275) + (.126)(275) = 46.6125$  million.
21. a/b.

Computer Usage (Hours)	Frequency	Relative Frequency
0.0 - 2.9	5	0.10
3.0 - 5.9	28	0.56
6.0 - 8.9	8	0.16
9.0 - 11.9	6	0.12
12.0 - 14.9	3	0.06
Total	50	1.00

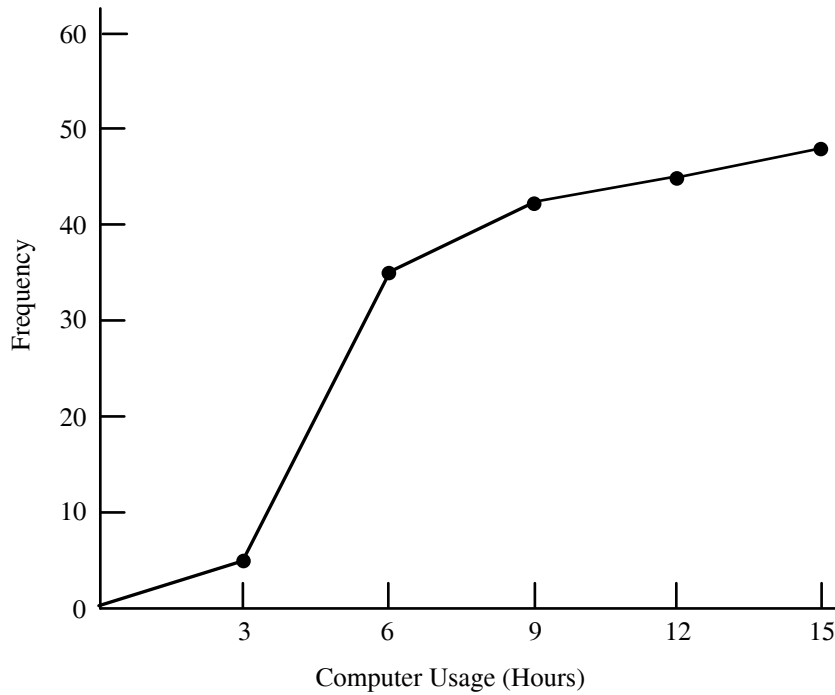


Chapter 2

c.



d.



e. The majority of the computer users are in the 3 to 6 hour range. Usage is somewhat skewed toward the right with 3 users in the 12 to 15 hour range.

22.

5		7 8
6		4 5 8
7		0 2 2 5 5 6 8
8		0 2 3 5

23. Leaf Unit = 0.1

6		3
7		5 5 7
8		1 3 4 8
9		3 6
10		0 4 5
11		3

24. Leaf Unit = 10

11		6
12		0 2
13		0 6 7
14		2 2 7
15		5
16		0 2 8
17		0 2 3

25.

9		8 9
10		2 4 6 6
11		4 5 7 8 8 9
12		2 4 5 7
13		1 2
14		4
15		1

Chapter 2

26. a. 100 shares at \$50 per share

1	0 3 7 7
2	4 5 5
3	0 0 5 5 9
4	0 0 0 5 5 8
5	0 0 0 4 5 5

This stem-and-leaf display shows that the trading prices are closely grouped together. Rotating the stem-and-leaf display counter clockwise shows a histogram that is slightly skewed to the left but is roughly symmetric.

b. 500 shares traded online at \$50 per share.

0	5 7
1	0 1 1 3 4
1	5 5 5 8
2	0 0 0 0 0 0
2	5 5
3	0 0 0
3	6
4	
4	
5	
5	
6	3

This stretched stem-and-leaf display shows that the distribution of online trading prices for most of the brokers for 500 shares are lower than the trading prices for broker assisted trades of 100 shares. There are a couple of outliers. York Securities charges \$36 for an online trade and Investors National charges much more than the other brokers: \$62.50 for an online trade.

27.

4	1 3 6 6 7
5	0 0 3 8 9
6	0 1 1 4 4 5 7 7 9
7	0 0 0 1 3 4 4 5 5 6 6 6 7 8 8
8	0 1 1 3 4 4 5 7 7 8 9
9	0 2 2 7

or

4		1 3
4		6 6 7
5		0 0 3
5		8 9
6		0 1 1 4 4
6		5 7 7 9 9
7		0 0 0 1 3 4 4
7		5 5 6 6 6 7 8 8
8		0 1 1 3 4 4
8		5 7 7 8 9
9		0 2 2
9		7

28. a.

0		5 8
1		1 1 3 3 4 4
1		5 6 7 8 9 9
2		2 3 3 3 5 5
2		6 8
3		
3		6 7 7 9
4		0
4		7 8
5		
5		
6		0

Chapter 2

b.

2000 P/E Forecast	Frequency	Percent Frequency
5 - 9	2	6.7
10 - 14	6	20.0
15 - 19	6	20.0
20 - 24	6	20.0
25 - 29	2	6.7
30 - 34	0	0.0
35 - 39	4	13.3
40 - 44	1	3.3
45 - 49	2	6.7
50 - 54	0	0.0
55 - 59	0	0.0
60 - 64	1	3.3
<b>Total</b>	<b>30</b>	<b>100.0</b>

29. a.

		y		Total
		1	2	
x	A	5	0	5
	B	11	2	13
	C	2	10	12
	Total	18	12	30

b.

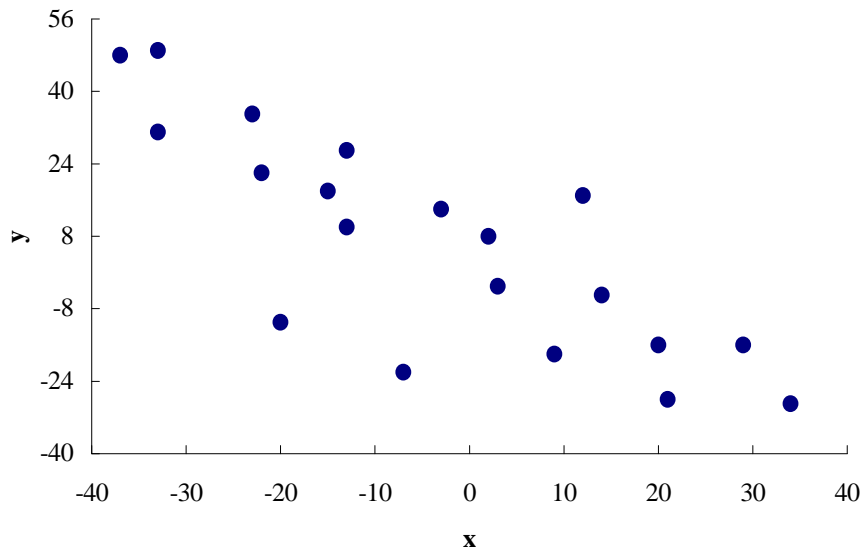
		y		Total
		1	2	
x	A	100.0	0.0	100.0
	B	84.6	15.4	100.0
	C	16.7	83.3	100.0

c.

		y	
		1	2
x	A	27.8	0.0
	B	61.1	16.7
	C	11.1	83.3
Total		100.0	100.0

d. Category A values for x are always associated with category 1 values for y. Category B values for x are usually associated with category 1 values for y. Category C values for x are usually associated with category 2 values for y.

30. a.



b. There is a negative relationship between  $x$  and  $y$ ;  $y$  decreases as  $x$  increases.

31. a. Row Percentages:

Education Level	Household Income (\$1000s)					Total
	Under 24.9	25.0-49.9	50.0-74.9	75.0-99.9	100 or More	
Not H.S. Graduate	58.54	25.80	10.02	3.41	2.23	100.00
H.S. Graduate	32.97	31.90	19.65	8.89	6.59	100.00
Some College	22.79	31.16	22.04	12.19	11.83	100.00
Bachelor's Degree	12.20	22.74	22.56	15.40	27.10	100.00
Beyond Bach. Deg.	8.58	15.79	19.15	16.76	39.72	100.00
Total	28.39	27.61	19.21	10.78	14.01	100.00

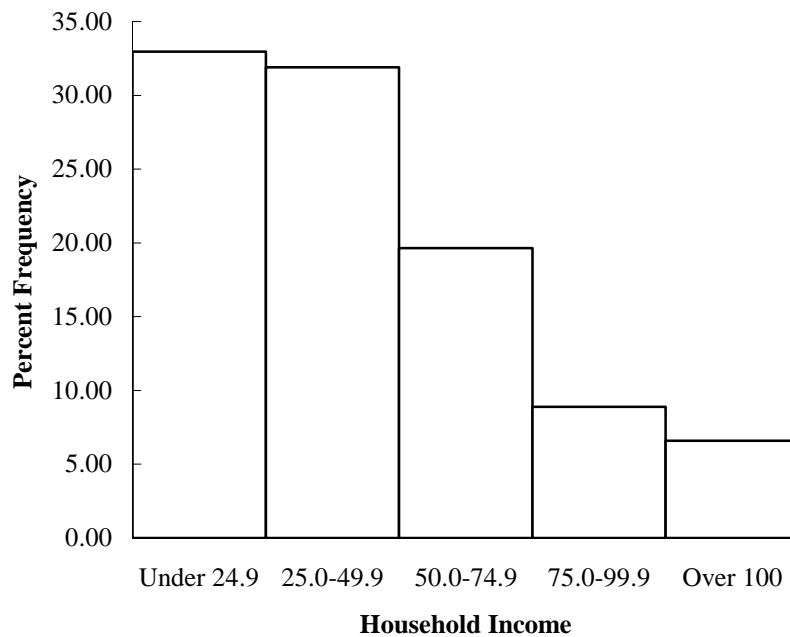
Chapter 2

There are six percent frequency distributions in this table with row percentages. The first five give the percent frequency distribution of income for each educational level. The total row provides an overall percent frequency distribution for household income.

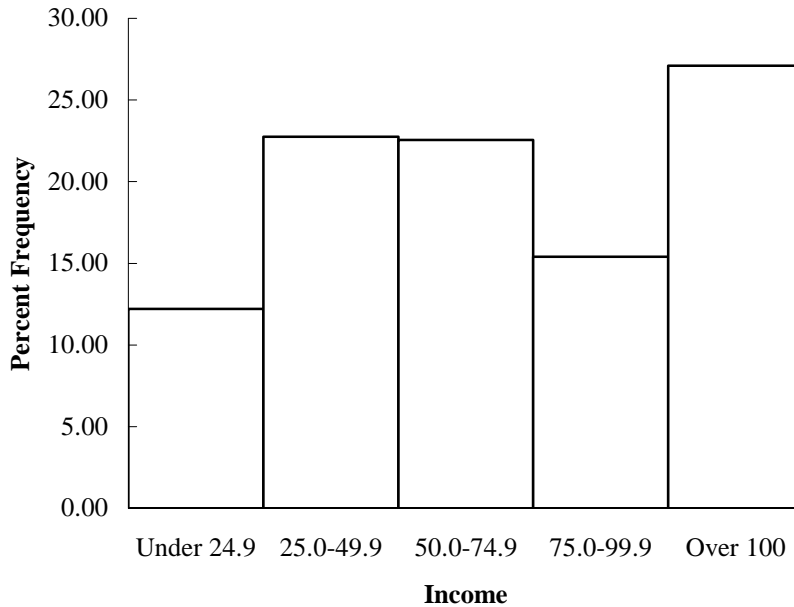
The second row, labeled H.S. Graduate, is the percent frequency distribution for households headed by high school graduates. The fourth row, labeled Bachelor's Degree, is the percent frequency distribution for households headed by bachelor's degree recipients.

- b. The percent of households headed by high school graduates earning \$75,000 or more is  $8.89\% + 6.59 = 15.48\%$ . The percent of households headed by bachelor's degree recipients earning \$75,000 or more is  $15.40\% + 27.10 = 42.50\%$ .
- c. The percent frequency histograms are shown below.

**High School Graduate**



**Bachelor's Degree**



The histograms show clearly that households headed by a college graduate earn more than households headed by a high school graduate. Yes, there is a positive relationship between educational level and income.

32. a. Column Percentages:

Education Level	Household Income (\$1000s)					Total
	Under 24.9	25.0-49.9	50.0-74.9	75.0-99.9	100 or More	
Not H.S. Graduate	32.70	14.82	8.27	5.02	2.53	15.86
H.S. Graduate	35.74	35.56	31.48	25.39	14.47	30.78
Some College	21.17	29.77	30.25	29.82	22.26	26.37
Bachelor's Degree	7.53	14.43	20.56	25.03	33.88	17.52
Beyond Bach. Deg.	2.86	5.42	9.44	14.74	26.86	9.48
Total	100.00	100.00	100.00	100.00	100.00	100.00

There are six percent frequency distributions in this table of column percentages. The first five columns give the percent frequency distributions for each income level. The percent frequency distribution in the "Total" column gives the overall percent frequency distributions for educational level. From that percent frequency distribution we see that 15.86% of the heads of households did not graduate from high school.

b. The column percentages show that 26.86% of households earning over \$100,000 were headed by persons having schooling beyond a bachelor's degree. The row percentages show that 39.72% of the households headed by persons with schooling beyond a bachelor's degree earned \$100,000 or more. These percentages are different because they came from different percent frequency distributions.



Chapter 2

- c. Compare the "under 24.9" percent frequency distributions to the "Total" percent frequency distributions. We see that for this low income level the percentage with lower levels of education is lower than for the overall population and the percentage with higher levels of education is higher than for the overall population.

Compare the "100 or more" percent frequency distribution to "Total" percent frequency distribution. We see that for this high income level the percentage with lower levels of education is lower than for the overall population and the percentage with higher levels of education is higher than for the overall population.

From the comparisons here it is clear that there is a positive relationship between household incomes and the education level of the head of the household.

33. a. The crosstabulation of condition of the greens by gender is below.

Gender	Green Condition		Total
	Too Fast	Fine	
Male	35	65	100
Female	40	60	100
Total	75	125	200

The female golfers have the highest percentage saying the greens are too fast: 40%.

- b. 10% of the women think the greens are too fast. 20% of the men think the greens are too fast. So, for the low handicappers, the men have a higher percentage who think the greens are too fast.
- c. 43% of the woman think the greens are too fast. 50% of the men think the greens are too fast. So, for the high handicappers, the men have a higher percentage who think the greens are too fast.
- d. This is an example of Simpson's Paradox. At each handicap level a smaller percentage of the women think the greens are too fast. But, when the crosstabulations are aggregated, the result is reversed and we find a higher percentage of women who think the greens are too fast.

The hidden variable explaining the reversal is handicap level. Fewer people with low handicaps think the greens are too fast, and there are more men with low handicaps than women.

34. a.

Sales/Margins/ROE	EPS Rating					Total
	0-19	20-39	40-59	60-79	80-100	
A				1	8	9
B		1	4	5	2	12
C	1		1	2	3	7
D	3	1		1		5
E		2	1			3
Total	4	4	6	9	13	36

b.

Sales/Margins/ROE	EPS Rating					Total
	0-19	20-39	40-59	60-79	80-100	
A				11.11	88.89	100
B		8.33	33.33	41.67	16.67	100
C	14.29		14.29	28.57	42.86	100
D	60.00	20.00		20.00		100
E		66.67	33.33			100

Higher EPS ratings seem to be associated with higher ratings on Sales/Margins/ROE. Of those companies with an "A" rating on Sales/Margins/ROE, 88.89% of them had an EPS Rating of 80 or higher. Of the 8 companies with a "D" or "E" rating on Sales/Margins/ROE, only 1 had an EPS rating above 60.

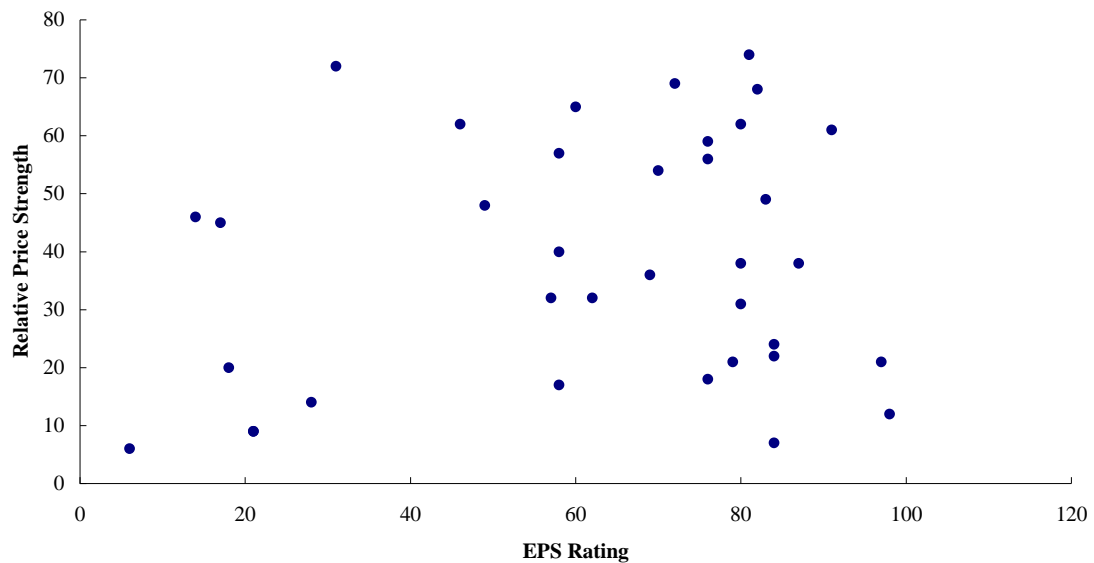
35. a.

Sales/Margins/ROE	Industry Group Relative Strength					Total
	A	B	C	D	E	
A	1	2	2	4		9
B	1	5	2	3	1	12
C	1	3		2	1	7
D	1		1	1	2	5
E		1	2			3
Total	4	11	7	10	4	36

b/c. The frequency distributions for the Sales/Margins/ROE data is in the rightmost column of the crosstabulation. The frequency distribution for the Industry Group Relative Strength data is in the bottom row of the crosstabulation.

d. Once the crosstabulation is complete, the individual frequency distributions are available in the margins.

36. a.



Chapter 2

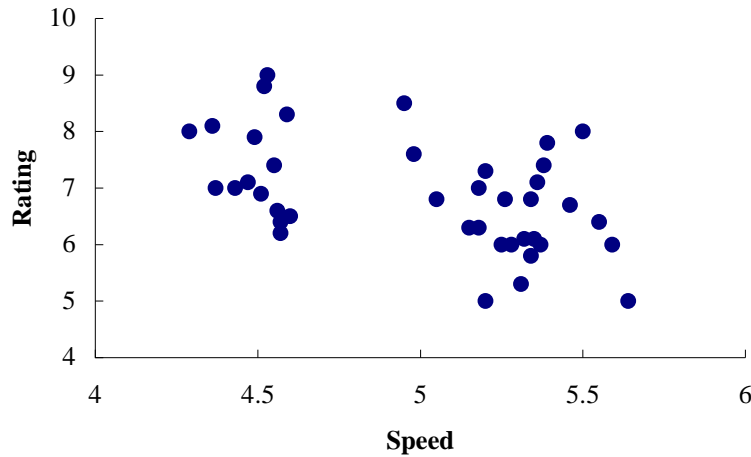
- b. One might expect stocks with higher EPS ratings to show greater relative price strength. However, the scatter diagram using this data does not support such a relationship.

The scatter diagram appears similar to the one showing "No Apparent Relationship" in the text.

37. a. The crosstabulation is shown below:

Position	Speed				Grand Total
	4-4.49	4.5-4.99	5-5.49	5.5-5.59	
Guard			12	1	13
Offensive tackle		2	7	3	12
Wide receiver	6	9			15
Grand Total	6	11	19	4	40

- b. There appears to be a relationship between Position and Speed; wide receivers had faster speeds than offensive tackles and guards.
- c. The scatter diagram is shown below:



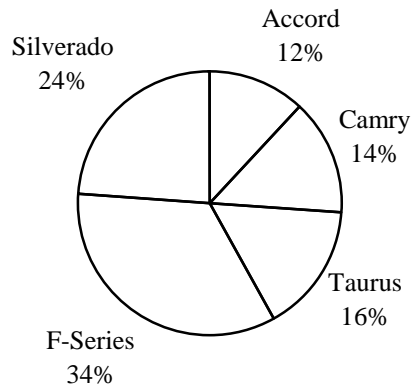
- d. There appears to be a relationship between Speed and Rating; slower speeds appear to be associated with lower ratings. In other words,, prospects with faster speeds tend to be rated higher than prospects with slower speeds.

38. a.

Vehicle	Frequency	Percent Frequency
F-Series	17	34
Silverado	12	24
Taurus	8	16
Camry	7	14
Accord	6	12
Total	50	100

- b. The two top selling vehicles are the Ford F-Series Pickup and the Chevrolet Silverado.

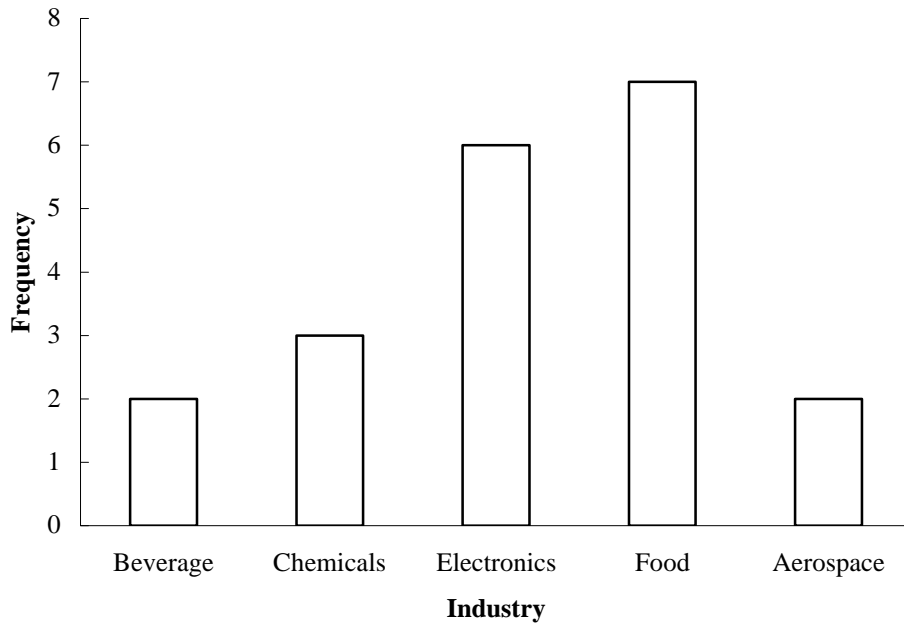
c.



39. a/b.

Industry	Frequency	Percent Frequency
Beverage	2	10
Chemicals	3	15
Electronics	6	30
Food	7	35
Aerospace	2	10
Totals:	20	100

c.



Chapter 2

40. a.

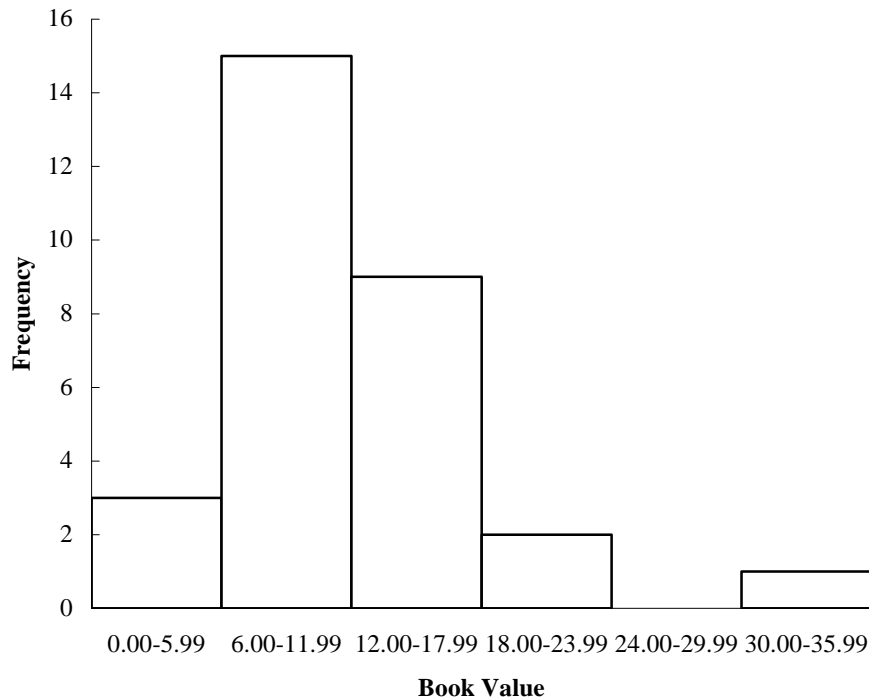
Response	Frequency	Percent Frequency
Accuracy	16	16
Approach Shots	3	3
Mental Approach	17	17
Power	8	8
Practice	15	15
Putting	10	10
Short Game	24	24
Strategic Decisions	7	7
Total	100	100

b. Poor short game, poor mental approach, lack of accuracy, and limited practice.

41. a/b/c/d.

Book Value per Share	Frequency	Relative Frequency	Cumulative Frequency	Cumulative Relative Frequency
0.00-5.99	3	0.10	3	0.10
6.00-11.99	15	0.50	18	0.60
12.00-17.99	9	0.30	27	0.90
18.00-23.99	2	0.07	29	0.97
24.00-29.99	0	0.00	29	0.97
30.00-35.99	1	0.03	30	1.00
Total	30	1.00		

e. The histogram shown below shows that the distribution of most of the book values is roughly symmetric. However, there is one outlier (General Motors).



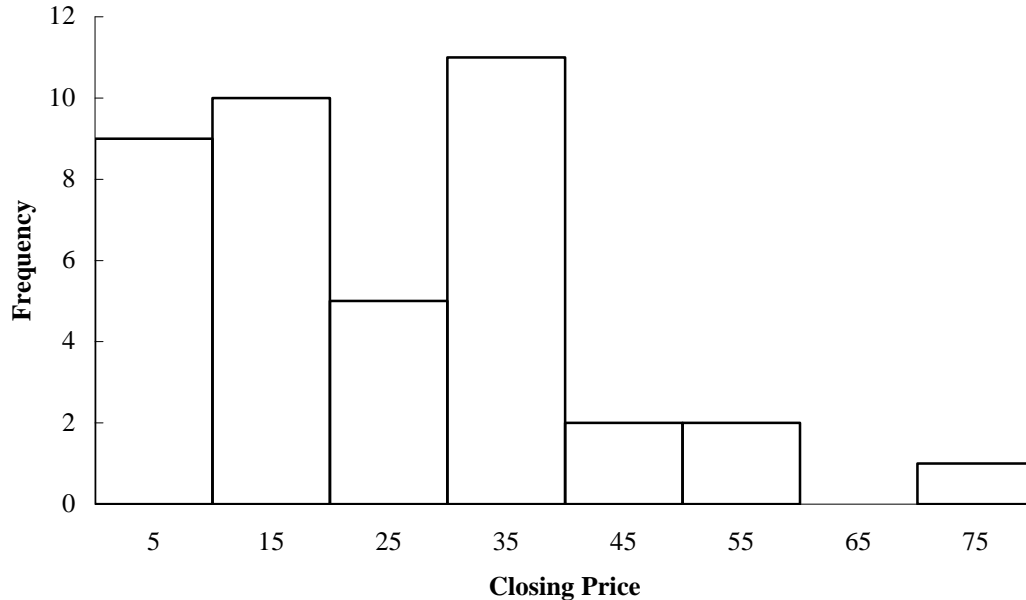
42. a.

Closing Price	Frequency	Relative Frequency
0 - 9 7/8	9	0.225
10 - 19 7/8	10	0.250
20 - 29 7/8	5	0.125
30 - 39 7/8	11	0.275
40 - 49 7/8	2	0.050
50 - 59 7/8	2	0.050
60 - 69 7/8	0	0.000
70 - 79 7/8	1	0.025
Totals	40	1.000

b.

Closing Price	Cumulative Frequency	Cumulative Relative Frequency
Less than or equal to 9 7/8	9	0.225
Less than or equal to 19 7/8	19	0.475
Less than or equal to 29 7/8	24	0.600
Less than or equal to 39 7/8	35	0.875
Less than or equal to 49 7/8	37	0.925
Less than or equal to 59 7/8	39	0.975
Less than or equal to 69 7/8	39	0.975
Less than or equal to 79 7/8	40	1.000

c.



d. Over 87% of common stocks trade for less than \$40 a share and 60% trade for less than \$30 per share.

Chapter 2

43. a.

Exchange	Frequency	Relative Frequency
American	3	0.15
New York	2	0.10
Over the Counter	15	0.75
	20	1.00

b.

Earnings Per Share	Frequency	Relative Frequency
0.00 - 0.19	7	0.35
0.20 - 0.39	7	0.35
0.40 - 0.59	1	0.05
0.60 - 0.79	3	0.15
0.80 - 0.99	2	0.10
	20	1.00

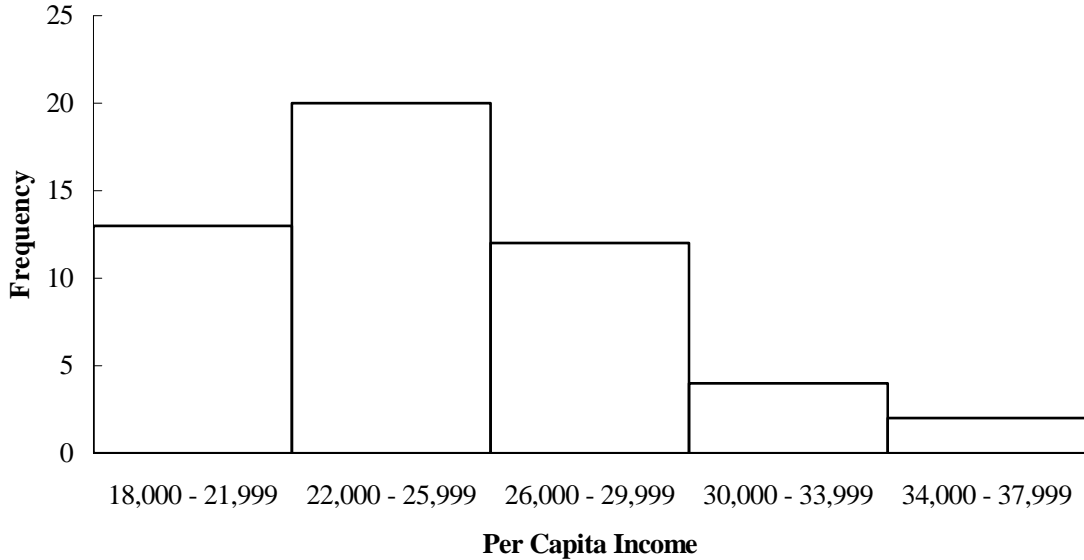
Seventy percent of the shadow stocks have earnings per share less than \$0.40. It looks like low EPS should be expected for shadow stocks.

Price-Earning Ratio	Frequency	Relative Frequency
0.00 - 9.9	3	0.15
10.0 - 19.9	7	0.35
20.0 - 29.9	4	0.20
30.0 - 39.9	3	0.15
40.0 - 49.9	2	0.10
50.0 - 59.9	1	0.05
	20	1.00

P-E Ratios vary considerably, but there is a significant cluster in the 10 - 19.9 range.

44.

Income (\$)	Frequency	Relative Frequency
18,000-21,999	13	0.255
22,000-25,999	20	0.392
26,000-29,999	12	0.235
30,000-33,999	4	0.078
34,000-37,999	2	0.039
Total	51	1.000



45. a.

0	8 9
1	0 2 2 2 3 4 4 4
1	5 5 6 6 6 6 7 7 8 8 8 8 9 9 9
2	0 1 2 2 2 3 4 4 4
2	5 6 8
3	0 1 3

b/c/d.

Number Answered Correctly	Frequency	Relative Frequency	Cumulative Frequency
5 - 9	2	0.050	2
10 - 14	8	0.200	10
15 - 19	15	0.375	25
20 - 24	9	0.225	34
25 - 29	3	0.075	37
30 - 34	<u>3</u>	<u>0.075</u>	40
Totals	40	1.000	



Chapter 2

- e. Relatively few of the students (25%) were able to answer 1/2 or more of the questions correctly. The data seem to support the Joint Council on Economic Education's claim. However, the degree of difficulty of the questions needs to be taken into account before reaching a final conclusion.

46. a/b.

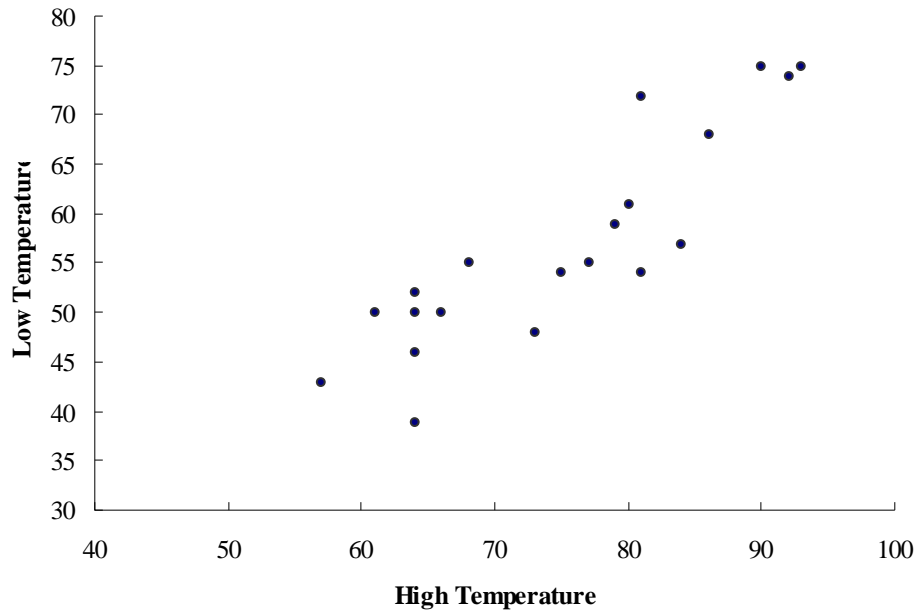
	High Temperature		Low Temperature
3		3	9
4		4	3 6 8
5	7	5	0 0 0 2 4 4 5 5 7 9
6	1 4 4 4 4 6 8	6	1 8
7	3 5 7 9	7	2 4 5 5
8	0 1 1 4 6	8	
9	0 2 3	9	

- c. It is clear that the range of low temperatures is below the range of high temperatures. Looking at the stem-and-leaf displays side by side, it appears that the range of low temperatures is about 20 degrees below the range of high temperatures.
- d. There are two stems showing high temperatures of 80 degrees or higher. They show 8 cities with high temperatures of 80 degrees or higher.

e.

Temperature	<u>Frequency</u>	
	High Temp.	Low. Temp.
30-39	0	1
40-49	0	3
50-59	1	10
60-69	7	2
70-79	4	4
80-89	5	0
90-99	3	0
Total	20	20

47. a.



b. There is clearly a positive relationship between high and low temperature for cities. As one goes up so does the other.

48. a.

Occupation	Satisfaction Score						Total
	30-39	40-49	50-59	60-69	70-79	80-89	
Cabinetmaker			2	4	3	1	10
Lawyer	1	5	2	1	1		10
Physical Therapist			5	2	1	2	10
Systems Analyst		2	1	4	3		10
Total	1	7	10	11	8	3	40

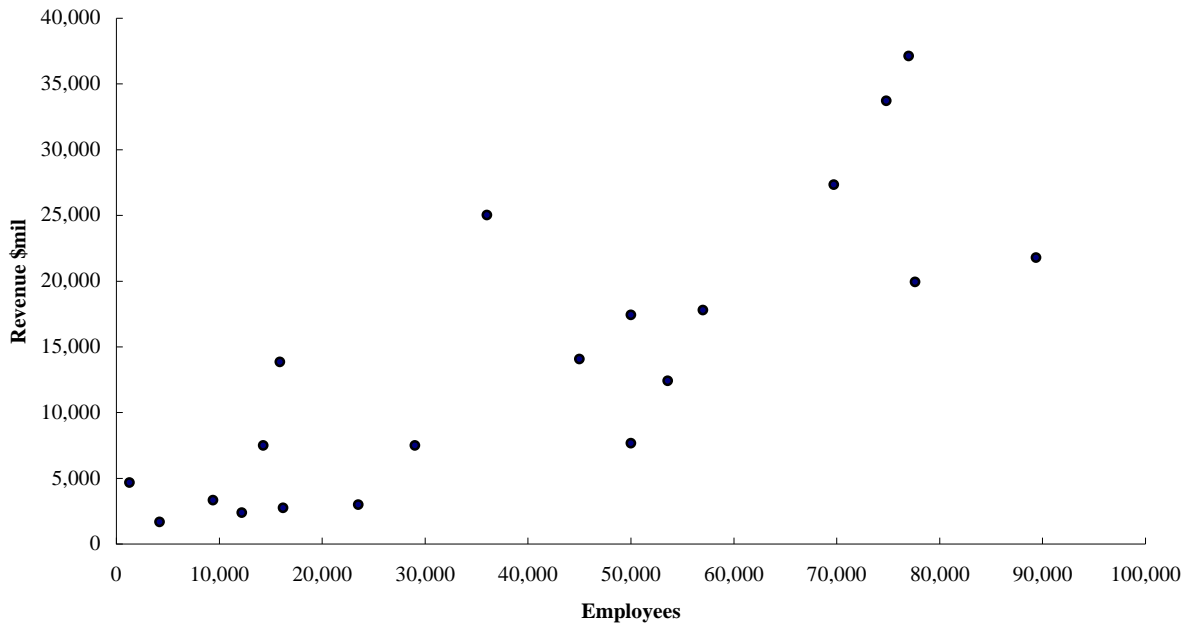
b.

Occupation	Satisfaction Score						Total
	30-39	40-49	50-59	60-69	70-79	80-89	
Cabinetmaker			20	40	30	10	100
Lawyer	10	50	20	10	10		100
Physical Therapist			50	20	10	20	100
Systems Analyst		20	10	40	30		100

c. Each row of the percent crosstabulation shows a percent frequency distribution for an occupation. Cabinet makers seem to have the higher job satisfaction scores while lawyers seem to have the lowest. Fifty percent of the physical therapists have mediocre scores but the rest are rather high.

Chapter 2

49. a.



b. There appears to be a positive relationship between number of employees and revenue. As the number of employees increases, annual revenue increases.

50. a.

Year Constructed	Fuel Type					Total
	Elec	Nat. Gas	Oil	Propane	Other	
1973 or before	40	183	12	5	7	247
1974-1979	24	26	2	2	0	54
1980-1986	37	38	1	0	6	82
1987-1991	48	70	2	0	1	121
Total	149	317	17	7	14	504

b.

Year Constructed	Frequency	Fuel Type	Frequency
1973 or before	247	Electricity	149
1974-1979	54	Nat. Gas	317
1980-1986	82	Oil	17
1987-1991	121	Propane	7
Total	504	Other	14
		Total	504

c. Crosstabulation of Column Percentages

Year Constructed	Fuel Type				
	Elec	Nat. Gas	Oil	Propane	Other
1973 or before	26.9	57.7	70.5	71.4	50.0
1974-1979	16.1	8.2	11.8	28.6	0.0
1980-1986	24.8	12.0	5.9	0.0	42.9
1987-1991	32.2	22.1	11.8	0.0	7.1
Total	100.0	100.0	100.0	100.0	100.0

- d. Crosstabulation of row percentages.

Year Constructed	Fuel Type					Total
	Elec	Nat. Gas	Oil	Propane	Other	
1973 or before	16.2	74.1	4.9	2.0	2.8	100.0
1974-1979	44.5	48.1	3.7	3.7	0.0	100.0
1980-1986	45.1	46.4	1.2	0.0	7.3	100.0
1987-1991	39.7	57.8	1.7	0.0	0.8	100.0

- e. Observations from the column percentages crosstabulation

For those buildings using electricity, the percentage has not changed greatly over the years. For the buildings using natural gas, the majority were constructed in 1973 or before; the second largest percentage was constructed in 1987-1991. Most of the buildings using oil were constructed in 1973 or before. All of the buildings using propane are older.

Observations from the row percentages crosstabulation

Most of the buildings in the CG&E service area use electricity or natural gas. In the period 1973 or before most used natural gas. From 1974-1986, it is fairly evenly divided between electricity and natural gas. Since 1987 almost all new buildings are using electricity or natural gas with natural gas being the clear leader.

51. a. Crosstabulation for stockholder's equity and profit.

Stockholders' Equity (\$000)	Profits (\$000)						Total
	0-200	200-400	400-600	600-800	800-1000	1000-1200	
0-1200	10	1				1	12
1200-2400	4	10			2		16
2400-3600	4	3	3	1	1	1	13
3600-4800					1	2	3
4800-6000		2	3	1			6
Total	18	16	6	2	4	4	50

- b. Crosstabulation of Row Percentages.

Stockholders' Equity (\$1000s)	Profits (\$000)						Total
	0-200	200-400	400-600	600-800	800-1000	1000-1200	
0-1200	83.33	8.33	0.00	0.00	0.00	8.33	100
1200-2400	25.00	62.50	0.00	0.00	12.50	0.00	100
2400-3600	30.77	23.08	23.08	7.69	7.69	7.69	100
3600-4800		0.00	0.00	0.00	33.33	66.67	100
4800-6000	0.00	33.33	50.00	16.67	0.00	0.00	100

- c. Stockholder's equity and profit seem to be related. As profit goes up, stockholder's equity goes up. The relationship, however, is not very strong.

Chapter 2

52. a. Crosstabulation of market value and profit.

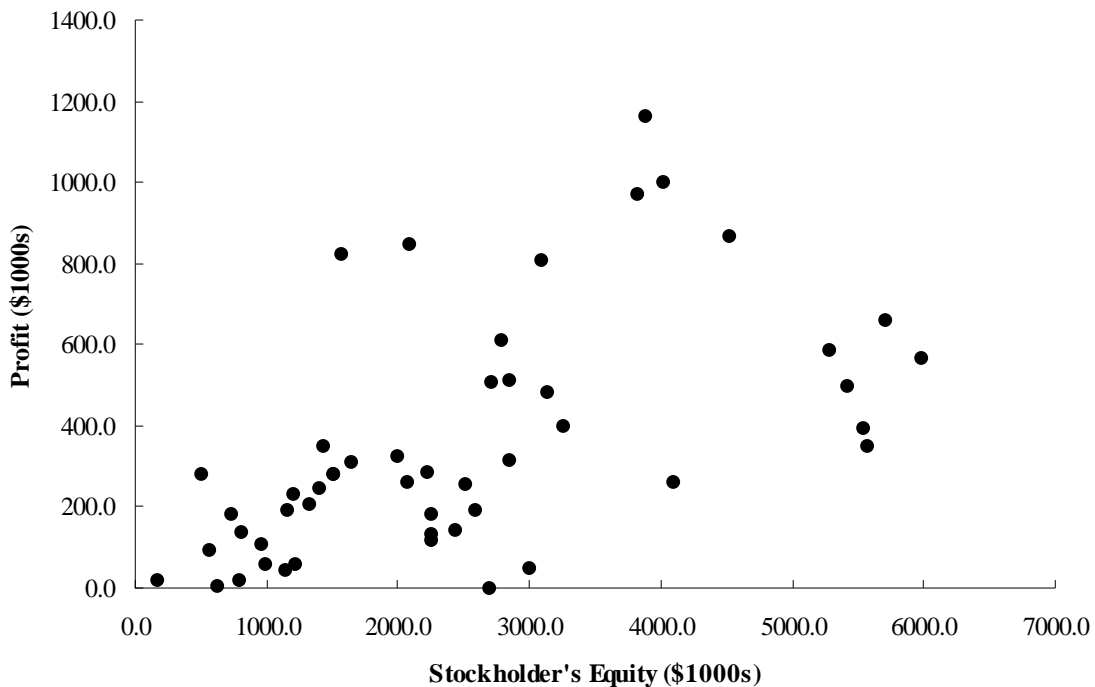
Market Value (\$1000s)	Profit (\$1000s)				Total
	0-300	300-600	600-900	900-1200	
0-8000	23	4			27
8000-16000	4	4	2	2	12
16000-24000		2	1	1	4
24000-32000		1	2	1	4
32000-40000		2	1		3
Total	27	13	6	4	50

b. Crosstabulation of Row Percentages.

Market Value (\$1000s)	Profit (\$1000s)				Total
	0-300	300-600	600-900	900-1200	
0-8000	85.19	14.81	0.00	0.00	100
8000-16000	33.33	33.33	16.67	16.67	100
16000-24000	0.00	50.00	25.00	25.00	100
24000-32000	0.00	25.00	50.00	25.00	100
32000-40000	0.00	66.67	33.33	0.00	100

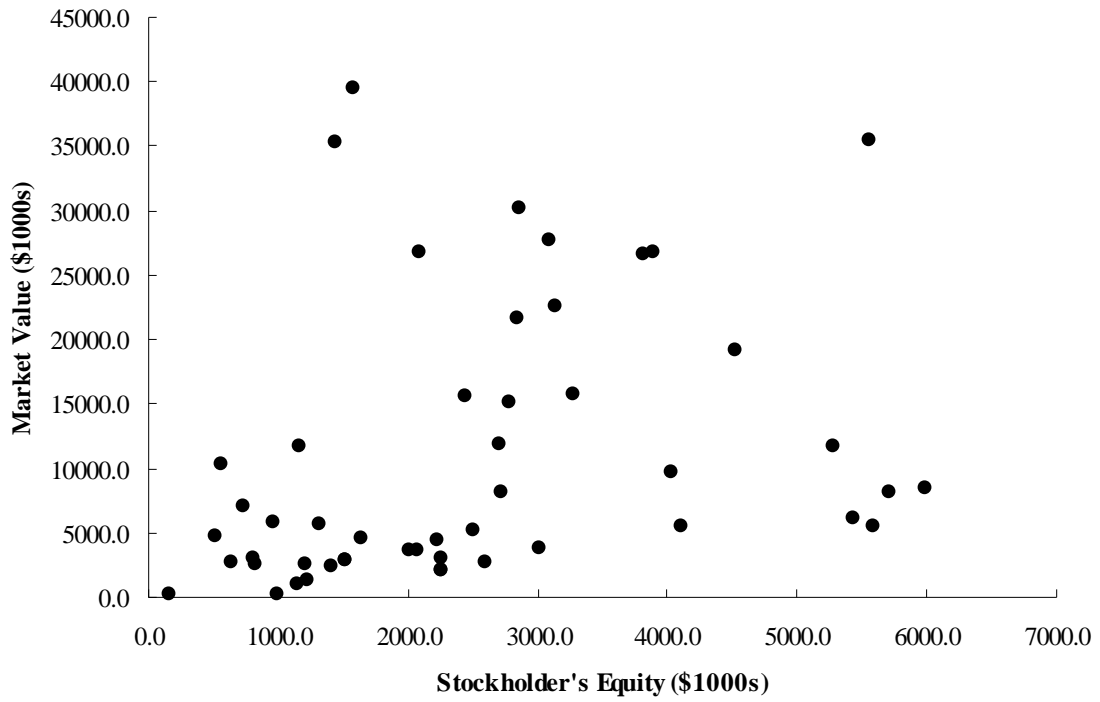
c. There appears to be a positive relationship between Profit and Market Value. As profit goes up, Market Value goes up.

53. a. Scatter diagram of Profit vs. Stockholder's Equity.



b. Profit and Stockholder's Equity appear to be positively related.

54. a. Scatter diagram of Market Value and Stockholder's Equity.



- b. There is a positive relationship between Market Value and Stockholder's Equity.