

# 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.  $.20(200) = 40$

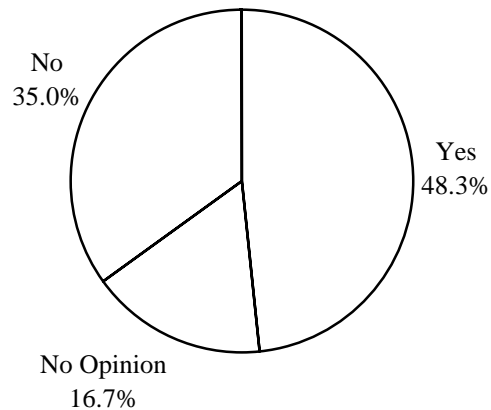
c/d.

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

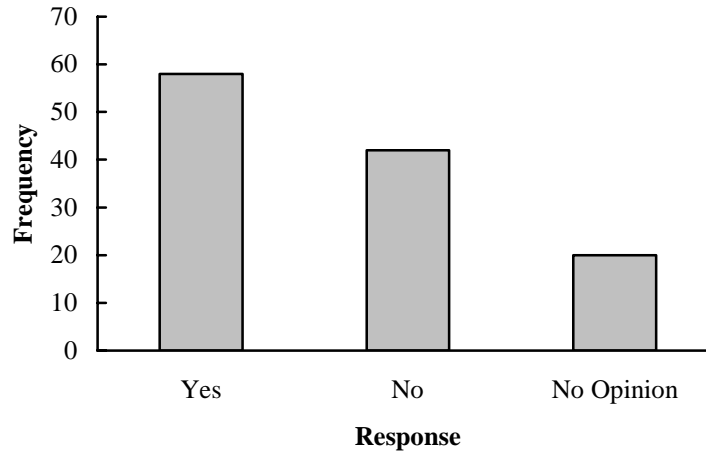
3. a.  $360^\circ \times 58/120 = 174^\circ$

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

c.



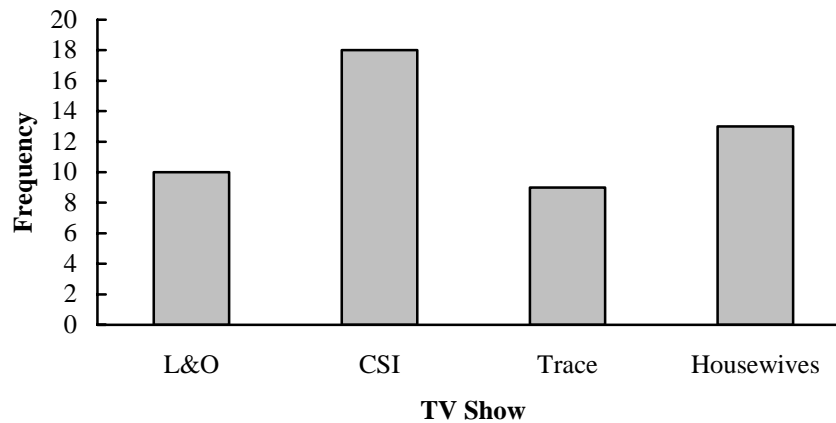
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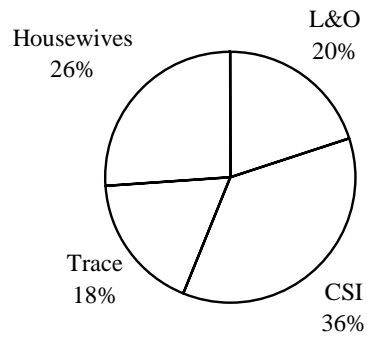
4. a. Qualitative.

b.

TV Show	Frequency	Percent Frequency
Law & Order	10	20%
CSI	18	36%
Without a Trace	9	18%
Desperate Housewives	13	26%
Total:	50	100%



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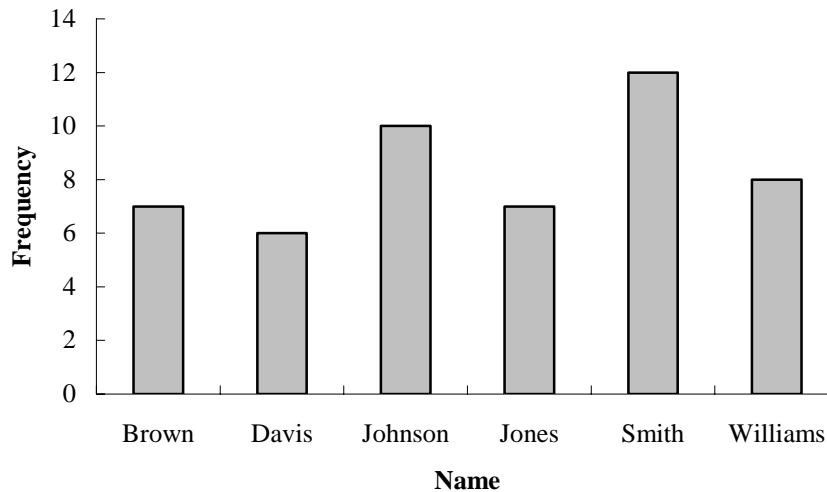


d. CSI had the largest viewing audience. Desperate Housewives was in second place.

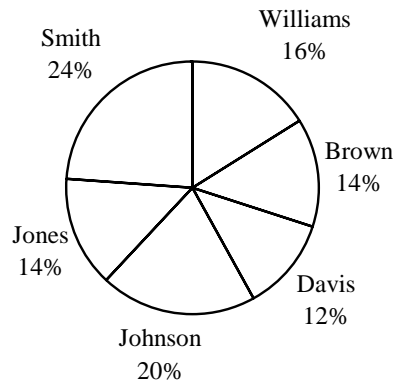
5. a.

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	8	.16	16%
	50	1.00	

b.



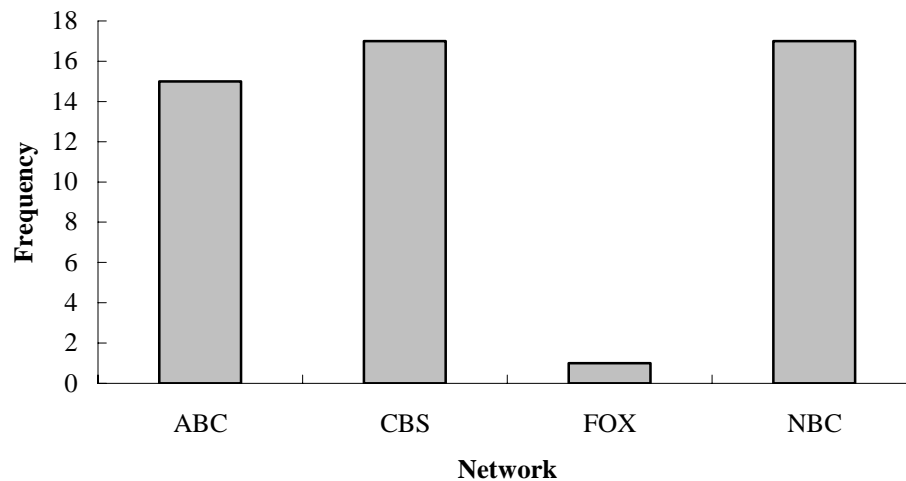
- c.
- |          |                               |
|----------|-------------------------------|
| Brown    | $.14 \times 360 = 50.4^\circ$ |
| Davis    | $.12 \times 360 = 43.2^\circ$ |
| Johnson  | $.20 \times 360 = 72.0^\circ$ |
| Jones    | $.14 \times 360 = 50.4^\circ$ |
| Smith    | $.24 \times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



d. Most common: Smith, Johnson and Williams

6. a.

Network	Frequency	Percent Frequency
ABC	15	30%
CBS	17	34%
FOX	1	2%
NBC	17	34%
Total	50	100%



b. CBS and NBC are tied, each with 17 of the top rated television shows. ABC is a close third with 15. The fact that the three networks are so close is surprising. FOX, the newest television network, does not have the history to compete with the other three networks in term of the top rated shows in television history.

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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%)

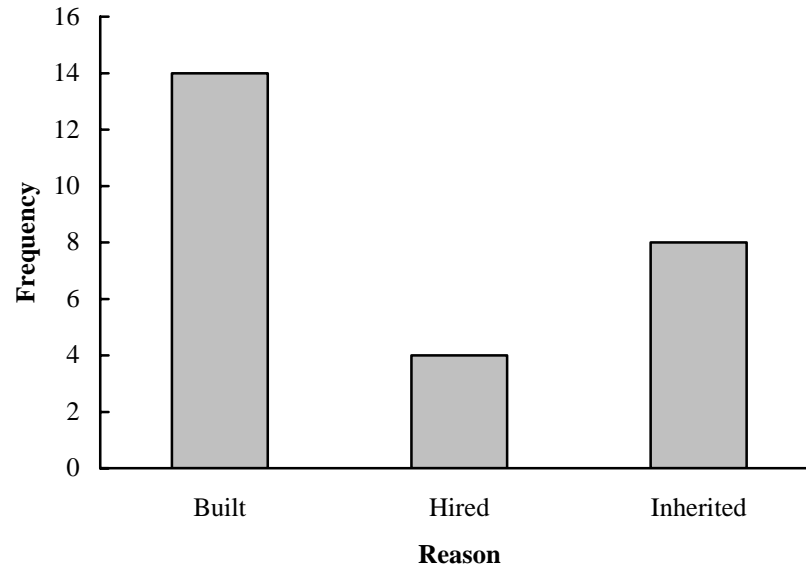
d. Right Field (Almost 13%)

e. Infielders (16 or 29.1%) to Outfielders (18 or 32.7%)

9. a/b.

Reason for CEO	Frequency	Percent Frequency
Built	14	53.8%
Hired	4	15.4%
Inherited	8	30.8%
Total	26	100.0%

- c. Construct the bar graph

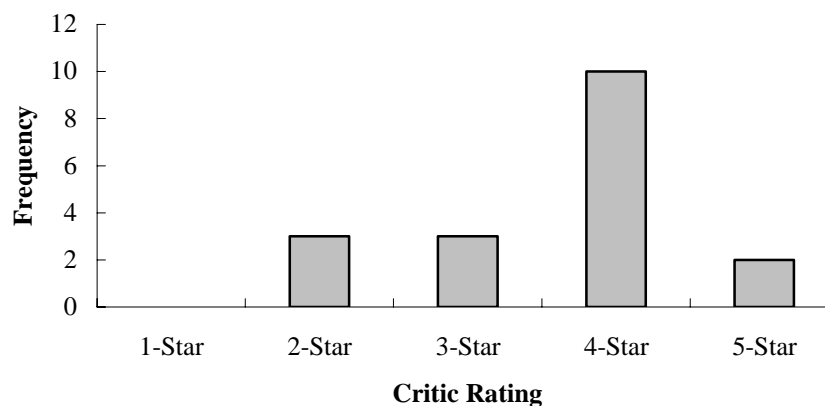


- d. 30.8% or almost one-third of the respondents became the CEO of a family- owned business because they inherited the business. The majority of CEOs of family-owned business became a CEO (53.8%) because they built the business themselves.
10. a. These data are qualitative because the data values are labels for rating categories ranging from Hated it (1) to Loved it (5).

- b.

Rating Category	Frequency	Relative Frequency
1-Star	0	.000
2-Star	3	.167
3-Star	3	.167
4-Star	10	.556
5-Star	<u>2</u>	<u>.111</u>
Total	18	1.000

- c.



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- d. The most frequent rating is 4-star with 10 (55.6%) of the critics indicating they really liked *Batman Begins*. Two critics gave it the top 5-star rating. At the other end of the scale, three critics provided a 2-star rating indicating they did not like it. A variation in ratings provided by the critic's can be expected. In general, the fact that 12 of the 18 critics indicated a 4-star or a 5-star rating shows *Batman Begins* had a very good rating by the majority of critics.

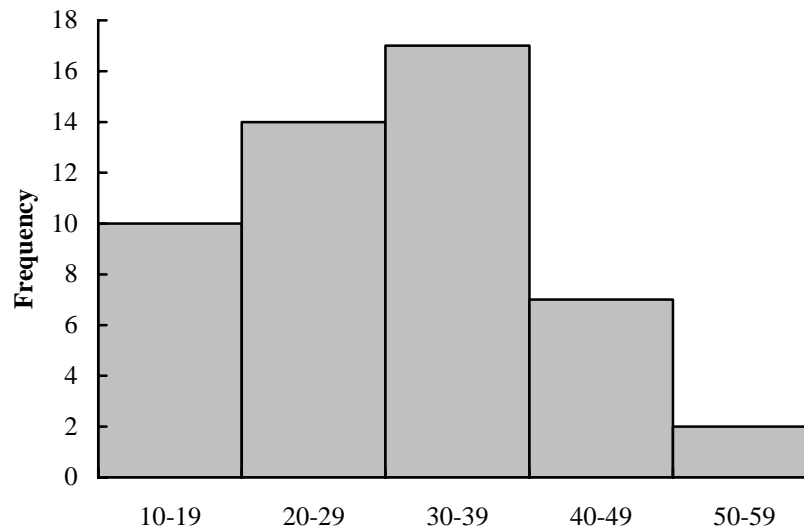
11.

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	25.0
24-26	<u>9</u>	<u>0.225</u>	<u>22.5</u>
Total	40	1.000	100.0

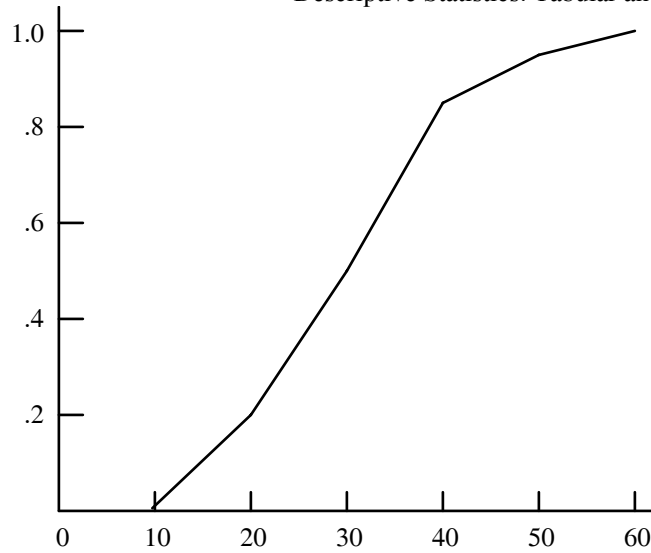
12.

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.



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

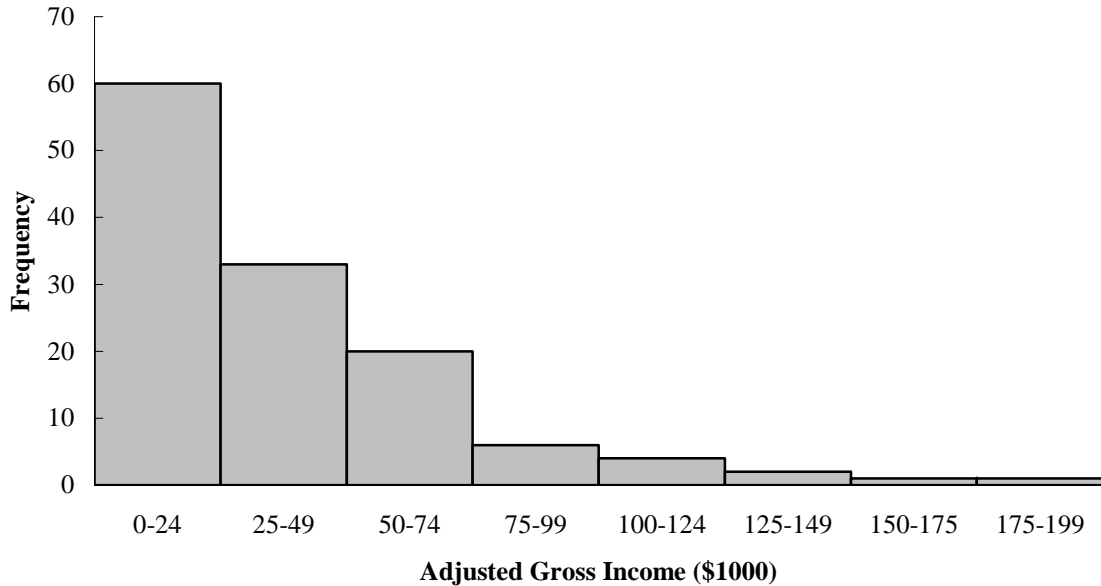
c/d.

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.  $12/20 = 0.60$

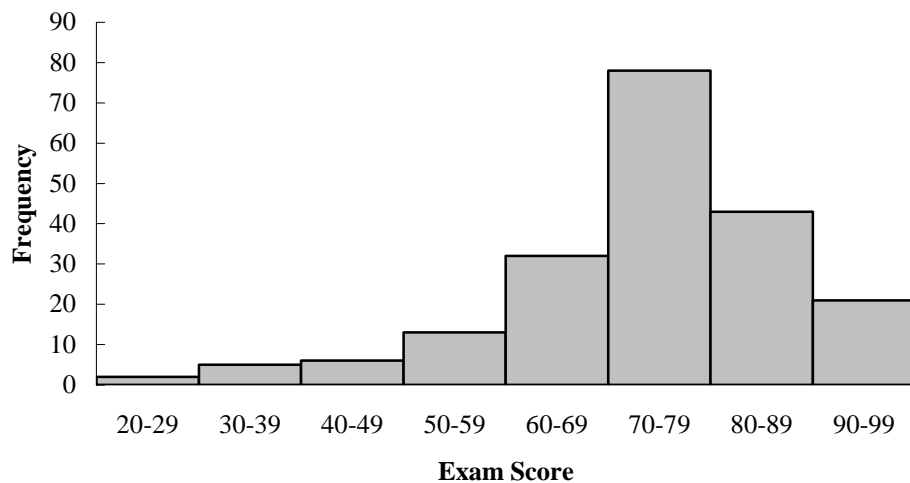
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16. a. The histogram of the adjusted gross incomes is as follows.



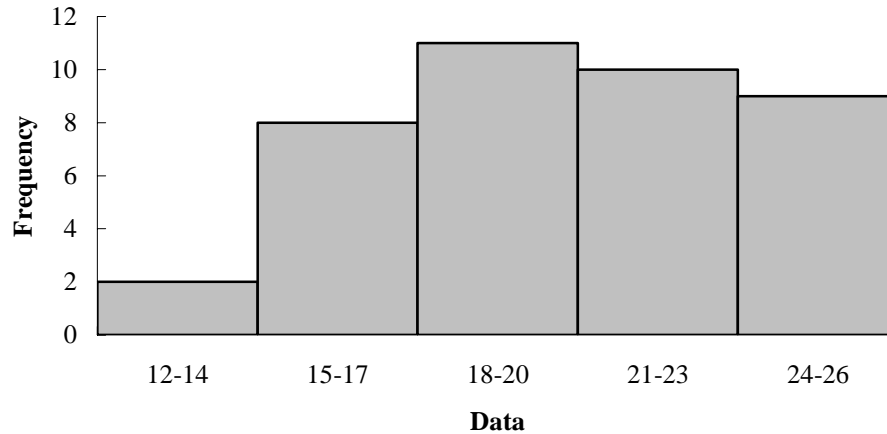
The histogram clearly shows that adjusted gross income is skewed to the right. And, of course, if gross income is skewed to the right, so is annual income. This makes sense because the majority of annual incomes are less than \$100,000. But, there are some individuals with very large incomes.

- b. The histogram for the exam scores is as follows.



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.

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

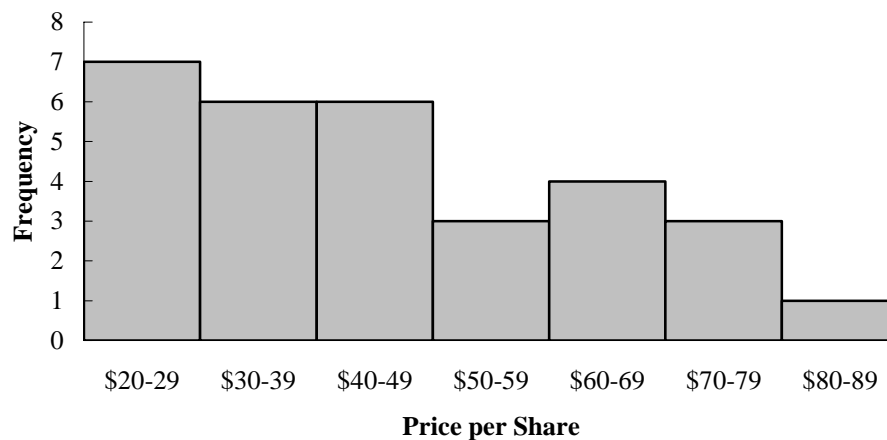


This histogram is skewed slightly to the left.

17. a. With a stock price range of \$20 to \$83, we selected a class width of \$10 which resulted in 7 classes. We used \$20-29 for the first class, \$30-39 for the second class and so on.

Price per Share	Frequency
\$20-29	7
\$30-39	6
\$40-49	6
\$50-59	3
\$60-69	4
\$70-79	3
\$80-89	1

- b. The histogram is as follows.



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The general shape of the distribution is skewed to the right. A greater frequency of price per share stocks occurs for the lower-priced stocks in the range \$20 to \$49 per share. A mid-priced stock appears to be in the \$40 to \$59 range, while the most frequent priced stock is in the \$20 to \$29 range. Stock prices range from \$20 per share to almost \$90 per share.

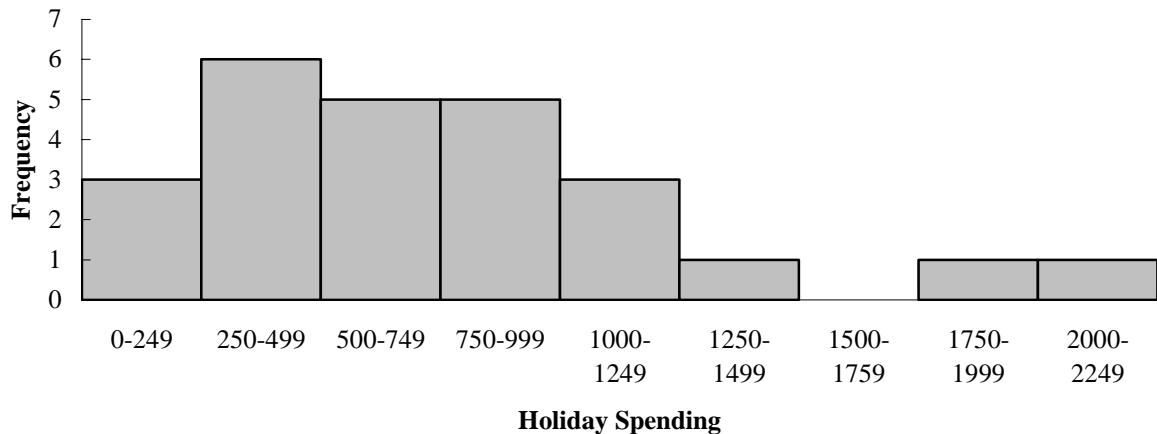
- c. IBM at \$83 per share was the highest priced stock; General Motors at \$20 per share was the lowest priced stock.
- d. A variety of comparisons are possible depending upon when the study is done.

18. a. The lowest holiday spending is \$180; the highest \$2050.

b.

Spending	Frequency	Percent
0-249	3	12
250-499	6	24
500-749	5	20
750-999	5	20
1000-1249	3	12
1250-1499	1	4
1500-1759	0	0
1750-1999	1	4
2000-2249	1	4
Total	25	100

c. The distribution shows a positive skewness.

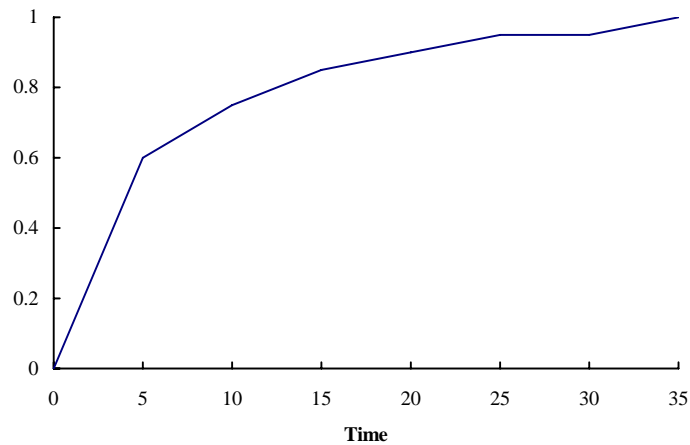


- d. The holiday spending ranges from \$0 to less than \$2250. The majority of the spending is between \$250 and \$1000 with 16 of the 25 customers, 64%, in this range. The middle or average spending is around \$750 per customer. The distribution has a positive skewness with two consumers above \$1750. One consumer is above \$2000.

19. a/b/c/d.

Class (Minutes)	Frequency	Relative Frequency	Cumulative Frequency	Cumulative Relative Frequency
1-5	12	.60	12	.60
6-10	3	.15	15	.75
11-15	2	.10	17	.85
16-20	1	.05	18	.90
21-25	1	.05	19	.95
26-30	0	.00	19	.95
31-34	1	.05	20	1.00

e.



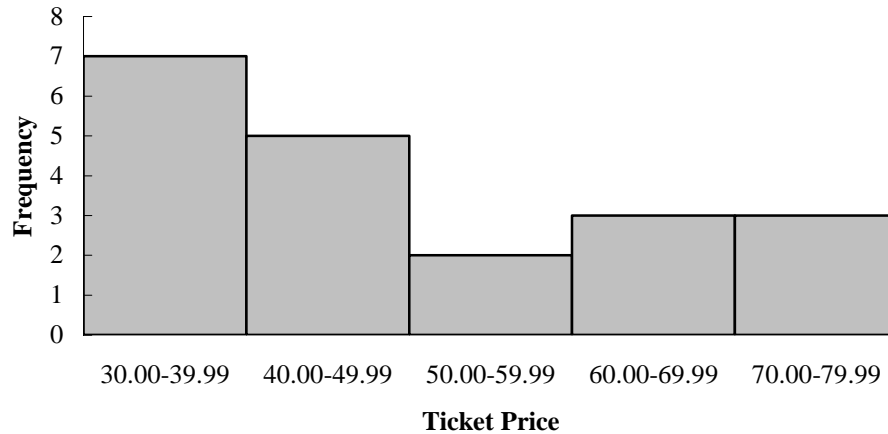
f. 60% of office workers spend 5 minutes or less on unsolicited email and spam. However, 25% of office workers spend more than 10 minutes per day on this task.

20. a.

Average Ticket Price	Frequency	Percent Frequency
30.00-39.99	7	35%
40.00-49.99	5	25%
50.00-59.99	2	10%
60.00-69.99	3	15%
70.00-79.99	<u>3</u>	<u>15%</u>
Totals	20	100%

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b.



c. Fleetwood Mac (\$78.34) was the most expensive concert.

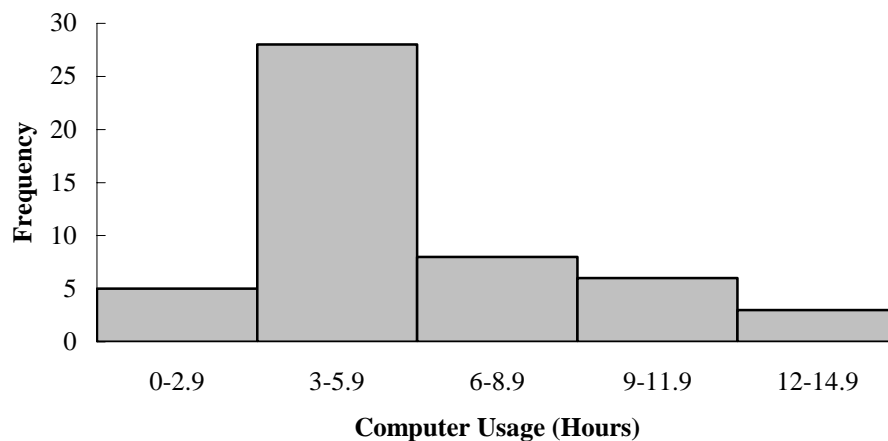
Harper/Johnson (\$33.70) was the least expensive concert.

d. The lowest average ticket prices were in the \$30 to \$39.99 range. Most frequent range was \$30 to \$39.99 followed by \$40 to 49.99. 60% of the shows had average ticket prices under \$50. 15% of the shows had average ticket prices in the highest range of \$70.00 to \$79.99. There were no average ticket prices of \$80 or more.

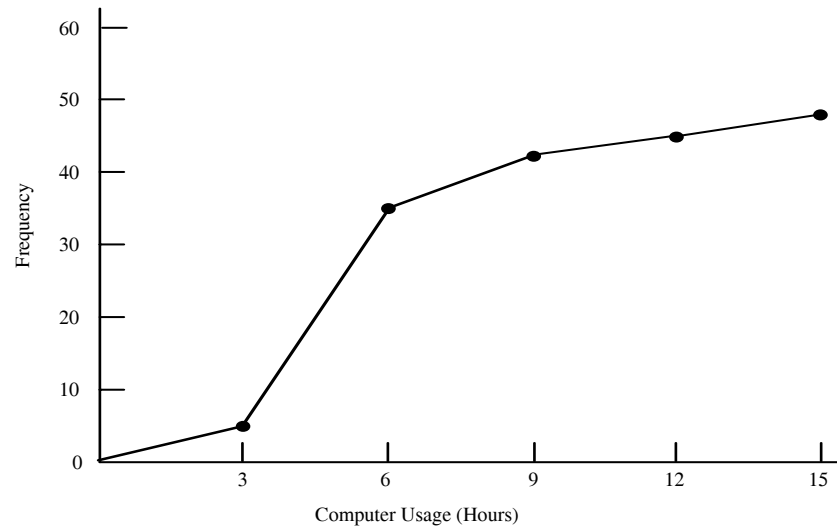
21. a/b.

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

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 14.9 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

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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

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. a.

7	5 9
8	3 6
9	5 6 8
10	0 4 4
11	1 5
12	
13	7
14	5 5

b. Observations such as the following can be made using the stem-and-leaf display.

- The daily rate varies from \$75 to \$145
- Typical mid-priced daily rates are \$95 to \$115 with the average daily rate around \$100.
- A daily rate in excess of \$115 should be considered relatively high. High daily rates of \$137 and \$145 were found at three ski resorts.

28. a.

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

b. Most frequent age group: 40-44 with 9 runners

c. 43 was the most frequent age with 5 runners

d.  $4/40 = 10\%$  of the runners were “20-something.” With only 10% of the registrants “20-something,” the article pointed out that surprisingly few registrants were in this age group. One suggested reason was that “20-somethings” don’t have the time to train for a 13.1 mile race. For “20-somethings,” college, starting careers, and starting families may take priority over training for long distance races.

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29. a.

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

b.

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

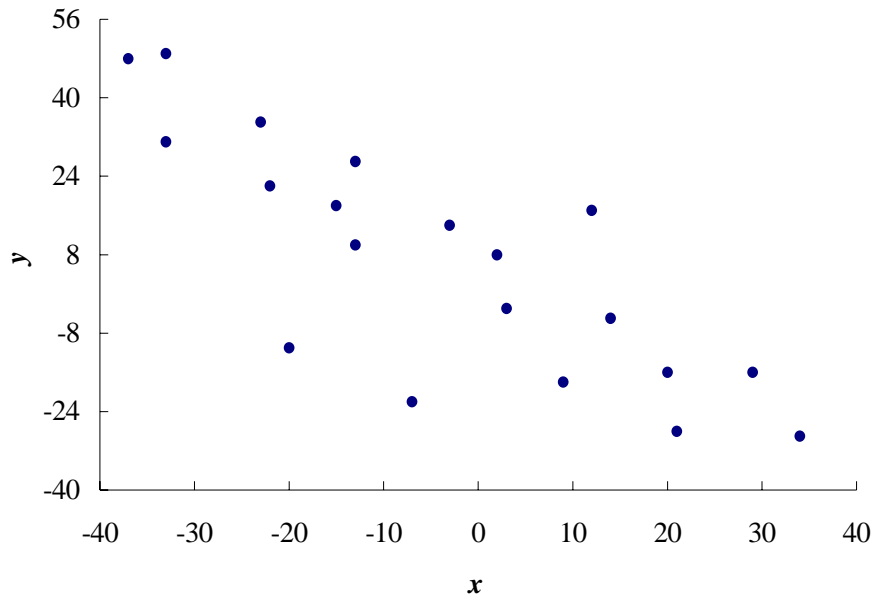
c.

		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 25	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

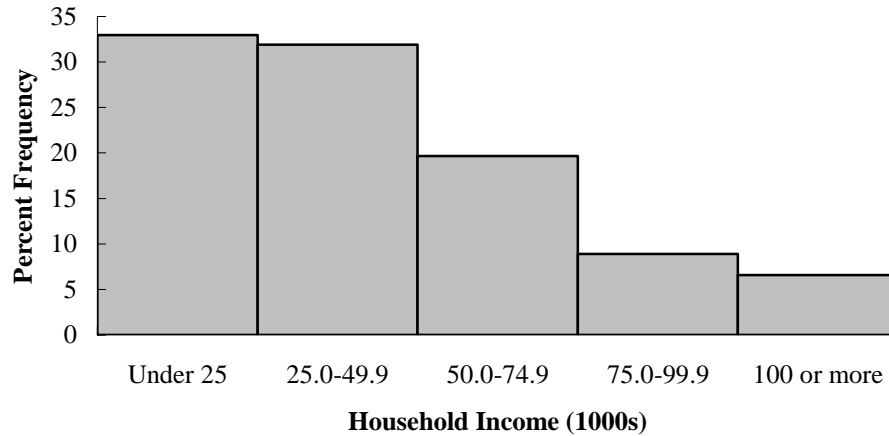
There are six percent frequency distributions in this table with row percentages. The first five give the percent frequency distribution of income for each educational level. The total row provides an overall percent frequency distribution for household income.

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.

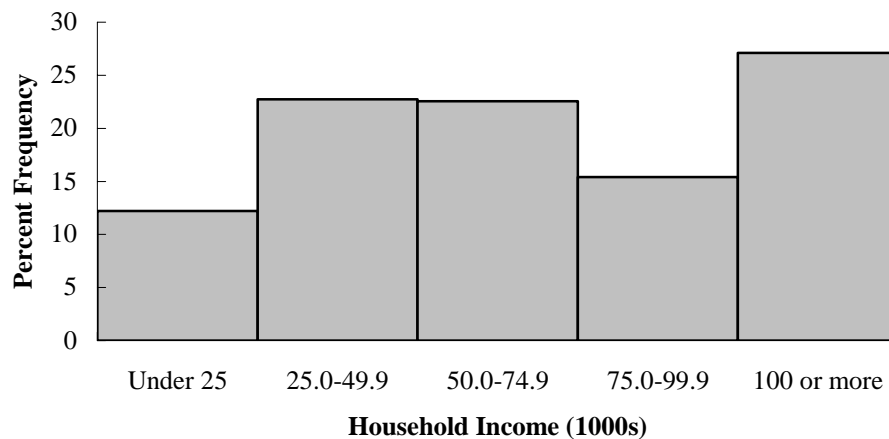
b. The percent of households headed by high school graduates earning \$75,000 or more is  $8.89\% + 6.59 = 15.48\%$ . The percent of households headed by bachelor's degree recipients earning \$75,000 or more is  $15.40\% + 27.10 = 42.50\%$ .

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- c. The percent frequency histogram for high school graduates.



The percent frequency distribution for college graduates with a bachelor's degree.



The histograms show clearly that households headed by a college graduate with a bachelor's degree earn more than households headed by a high school graduate. Yes, there is a positive relationship between education level and income.

32. a. Column Percentages:

Education Level	Household Income (\$1000s)					Total
	Under 25	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.
- c. Compare the "under 25" 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.

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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.

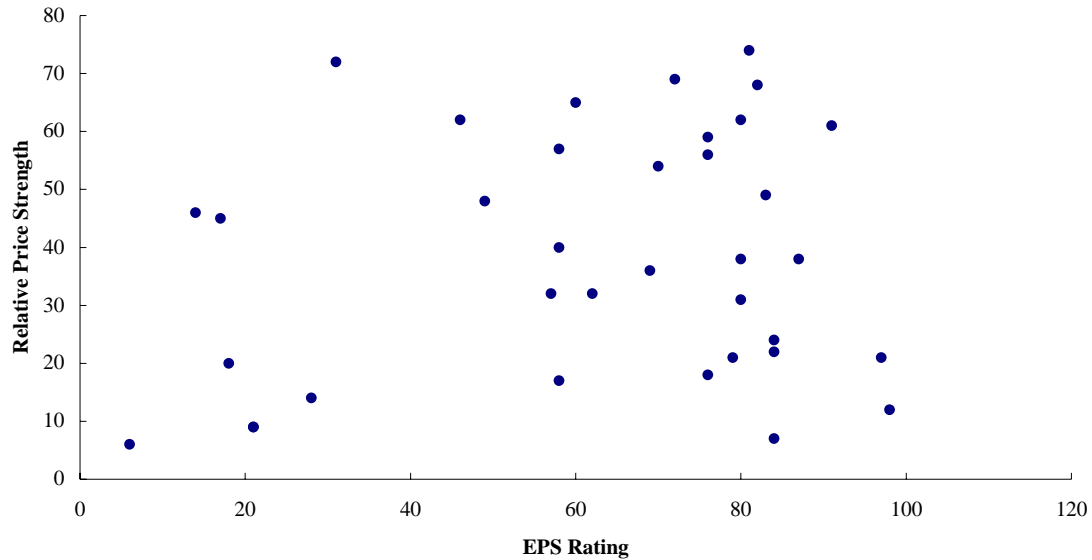
Sales/Margins/ROE	Industry Group Relative Strength					Total
	A	B	C	D	E	
A	1	2	2	4		9
B	1	5	2	3	1	12
C	1	3		2	1	7
D	1		1	1	2	5
E		1	2			3
Total	4	11	7	10	4	36

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.



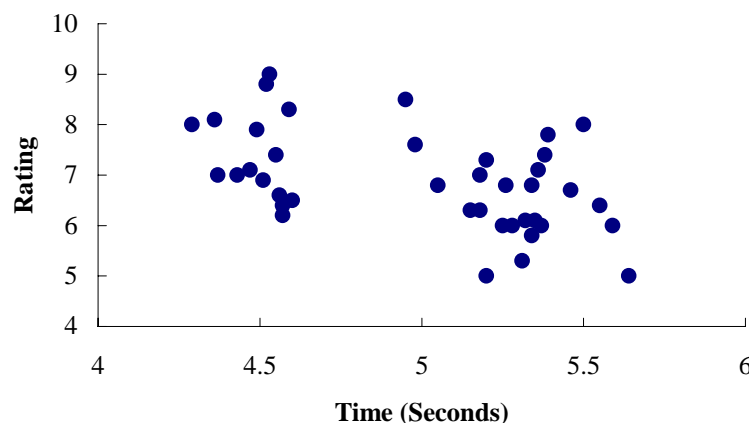
- b. One might expect stocks with higher EPS ratings to show greater relative price strength. However, the scatter diagram using this data does not support such a relationship.

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

37. a. The crosstabulation is shown below:

Position	Time (Seconds)				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 Time. Wide receivers, as expected, are faster and took less time to run 40 yards.
- c. The scatter diagram is shown below:



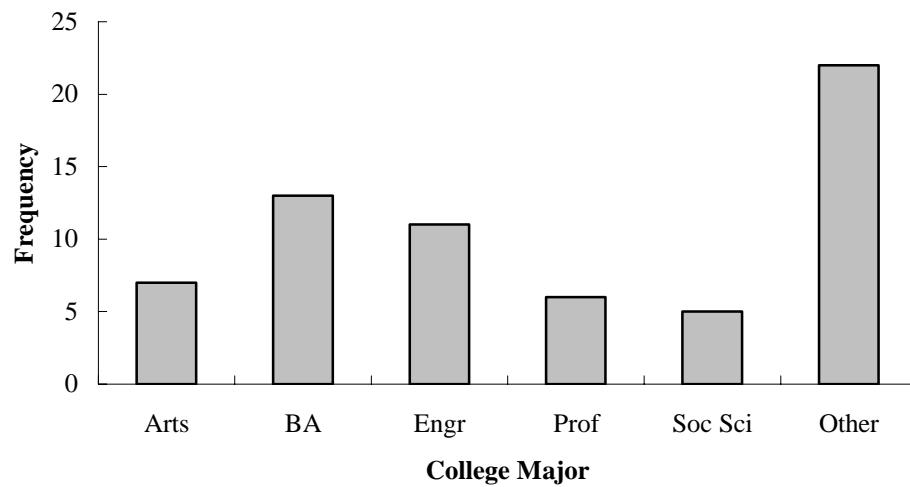
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- d. There is a negative relationship between Time and Rating. Higher times to run 40 yards are associated with lower ratings. In other words, slower prospects tend to be rated lower than faster prospects.

38. a.

Major	Frequency	Percent Frequency
Arts/Humanities	7	10.9
Business Administration	13	20.3
Engineering	11	17.2
Professional	6	9.4
Social Science	5	7.8
Other	<u>22</u>	<u>34.4</u>
Total	64	100.0

b.



- c. 34.4% select another major. So  $100\% - 34.4\% = 65.6\%$  select one of the five most popular majors.
- d. Business Administration is the most popular major selected by incoming freshmen, 20.3%

39. a.

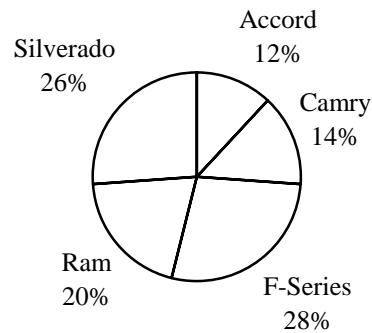
Vehicle	Frequency	Percent Frequency
Accord	6	12%
Camry	7	14%
F-Series	14	28%
Ram	10	20%
Silverado	13	26%

- b. The Ford F-Series (ranked #1) is the top-selling pickup truck and the Toyota Camry (ranked #4) is the top-selling passenger car.

c. Pie Chart

Accord	$12\%(360) = 43$ degrees
Camry	$14\%(360) = 50$ degrees
F-Series	$28\%(360) = 101$ degrees
Ram	$20\%(360) = 72$ degrees
Silverado	$26\%(360) = 94$ degrees

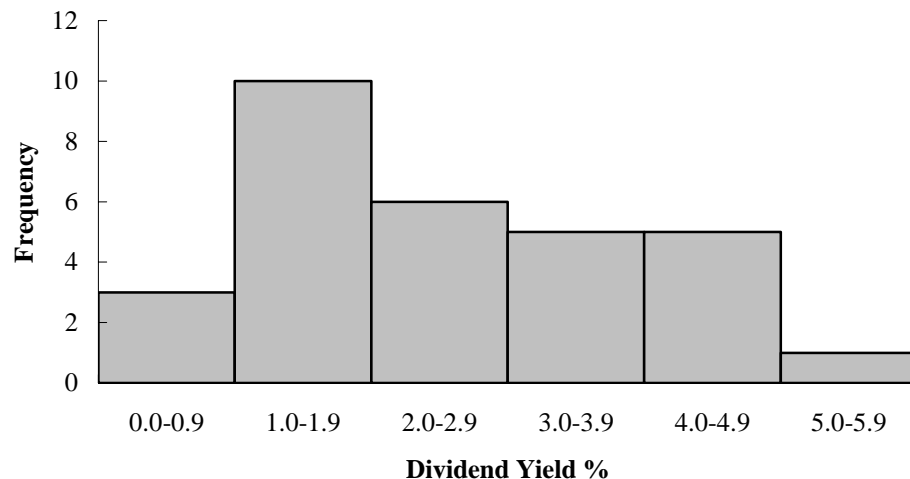




40. a.

Yield%	Frequency	Percent Frequency
0.0-0.9	3	10.0
1.0-1.9	10	33.3
2.0-2.9	6	20.0
3.0-3.9	5	16.7
4.0-4.9	5	16.7
5.0-5.9	<u>1</u>	<u>3.3</u>
Total	30	100.0

b.



- c. The distribution is skewed to the right.
- d. Dividend yield ranges from less than 1% to over 5%. The most frequent range is 1.0% to 1.9%. Average dividend yields looks to be between 2% and 3%. Over 50% of the companies pay 1.0 % to 2.9%. 20% of the companies pay 4% or more.
- e. General Motors pays the highest dividend yield at 5.2%. 500 shares at \$20 per share is an investment of  $500(\$20) = \$10,000$ . A 5.2% dividend yield provides  $.052(10,000) = \$520$  of dividend income per year.

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41. 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	<u>7</u>	<u>7</u>
Total	100	100

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

42. a.

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

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
	<u>20</u>	<u>1.00</u>

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.

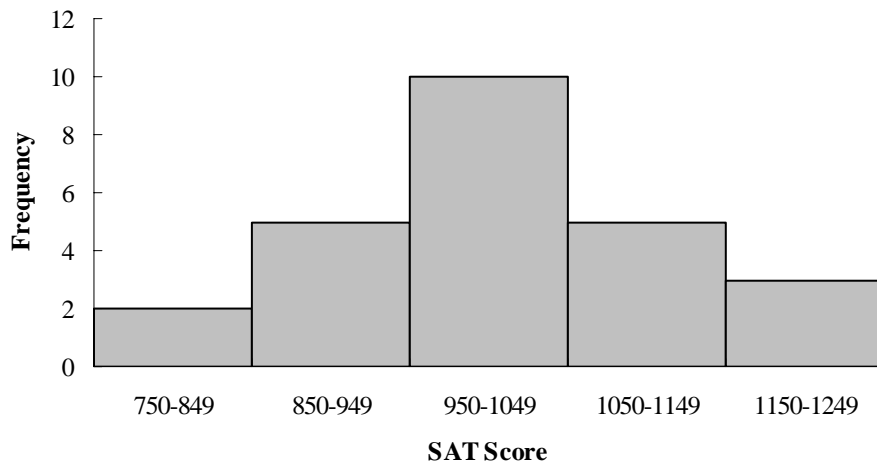
Price-Earning Ratio	Frequency	Relative Frequency
0.00 - 9.9	3	0.15
10.0 - 19.9	7	0.35
20.0 - 29.9	4	0.20
30.0 - 39.9	3	0.15
40.0 - 49.9	2	0.10
50.0 - 59.9	1	0.05
	<u>20</u>	<u>1.00</u>

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



43. a.

SAT Score	Frequency
750-849	2
850-949	5
950-1049	10
1050-1149	5
1150-1249	3
Total	25



b. The distribution is very nearly symmetrical.

c. 10 of 20 or 40% of the scores are between 950 and 1049. Average score looks to be a little over 1000. Scores below 750 or above 1249 are unusual.

44. a.

1	7 7 8
2	1
3	4
4	
5	
6	
7	2 7
8	6
9	
10	
11	6
12	7

b. Smallest roughly \$3 billion or less; medium \$7-\$8 billion; largest \$11-\$12 billion.

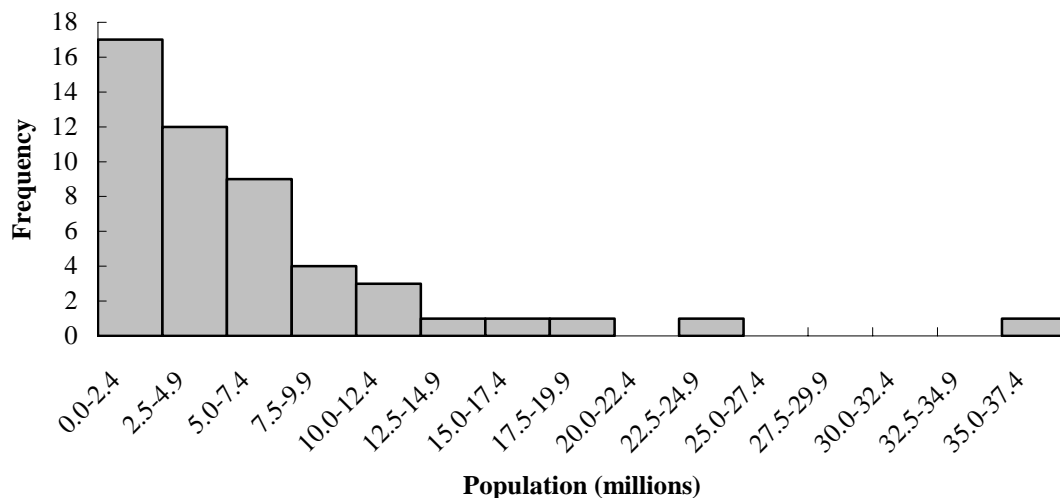
c. CVS (\$12,700) and Walgreens (\$11,660)

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45. a.

Population	Frequency	Percent Frequency
0.0-2.4	17	34
2.5-4.9	12	24
5.0-7.4	9	18
7.5-9.9	4	8
10.0-12.4	3	6
12.5-14.9	1	2
15.0-17.4	1	2
17.5-19.9	1	2
20.0-22.4	0	0
22.5-24.9	1	2
25.0-27.4	0	0
27.5-29.9	0	0
30.0-32.4	0	0
32.5-34.9	0	0
35.0-37.4	<u>1</u>	<u>2</u>
Total	50	100

b.

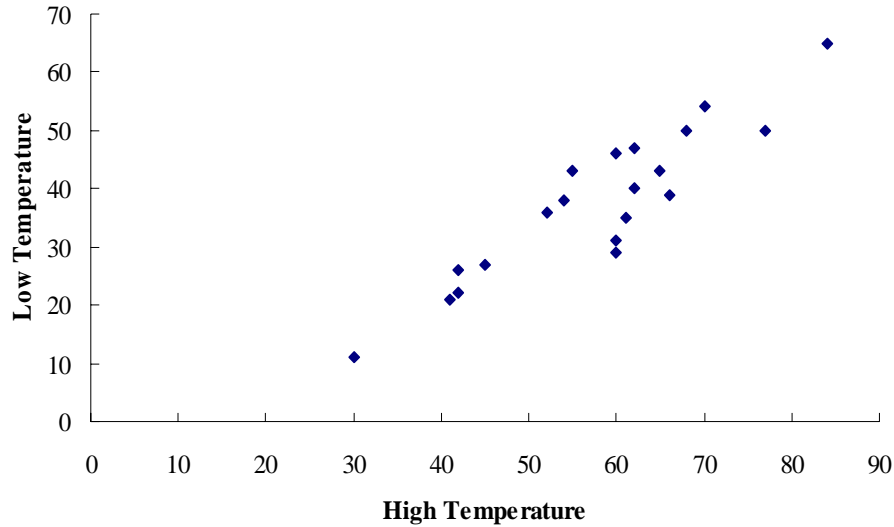


c. High positive skewness.

d. 17 states (34%) have a population less than 2.5 million. Over half of the states have population less than 5 million (29 states – 58%). Only eight states have a population greater than 10 million (California, Florida, Illinois, Michigan, New York, Ohio, Pennsylvania and Texas). The largest state is California (35.9 million) and the smallest state is Wyoming (500 thousand).



46. a.



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

47. a& b.

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

c. The most frequent range for temperature was in the 60s (9 of 20). Only one low temperature was above 54. High temperatures were mostly 41 to 68, while low temperatures were mostly 21 to 47.

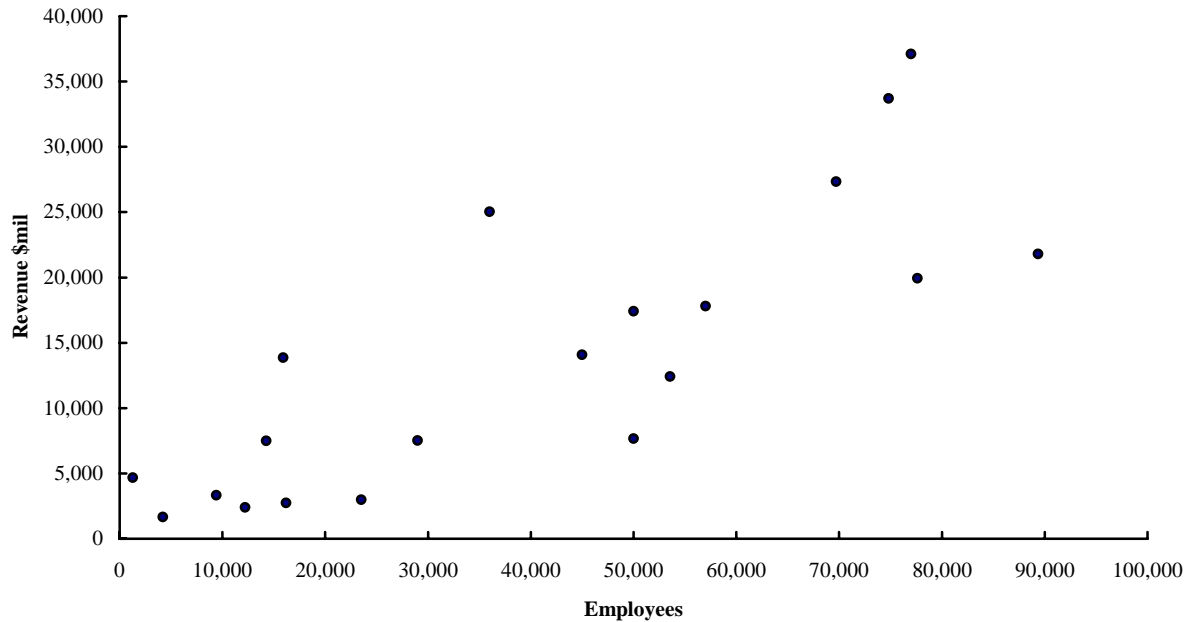
Low was 11; High was 84.

d.

High Temp	Frequency	Low Temp	Frequency
10-19	0	10-19	1
20-29	0	20-29	5
30-39	1	30-39	5
40-49	4	40-49	5
50-59	3	50-59	3
60-69	9	60-69	1
70-79	2	70-79	0
80-89	<u>1</u>	80-89	<u>0</u>
Total	20	Total	20

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48. a.



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

49. 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.

50. 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.

51. 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

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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

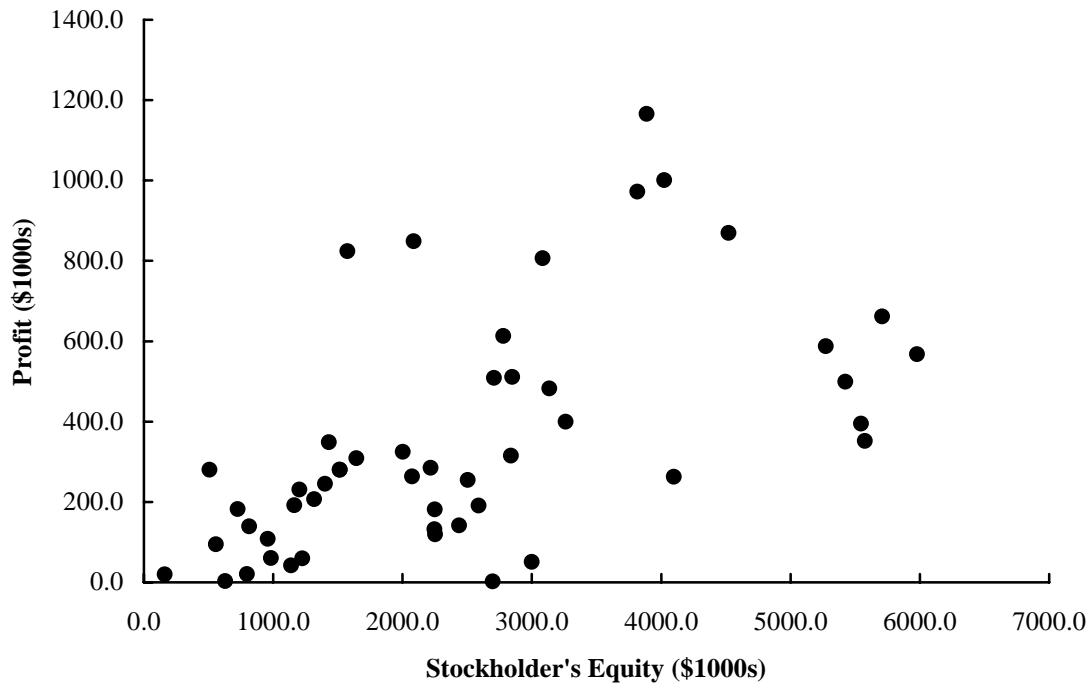
e. Observations from the column percentages crosstabulation

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.

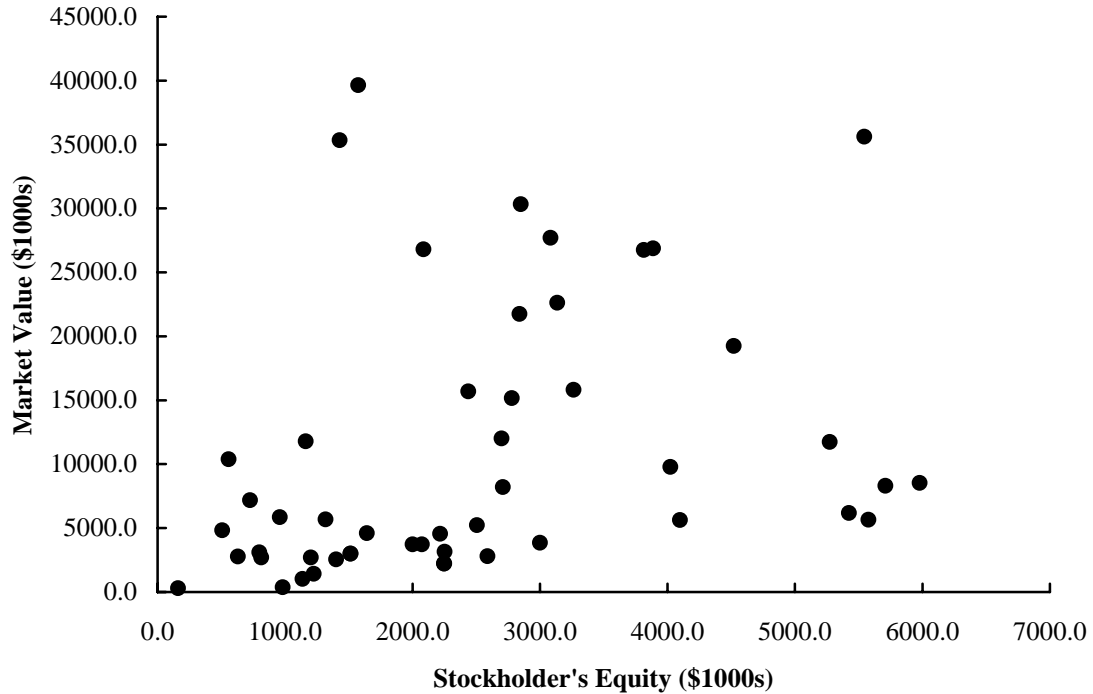
52. a. Scatter diagram of Profit vs. Stockholder's Equity.



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



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



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

54. 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.