CHAPTER 2

2.1 (a)

Category	Frequency	Percentage
A	13	26%
B	28	56
C	9	18

(b) Category "B" is the majority.

2.2 (a) Table frequencies for all student responses

	Student Major Categories			
Gender	A	C	M	Totals
Male	14	9	2	25
Female	6	6	3	15
Totals	20	15	5	40

(b) Table percentages based on overall student responses

	Student Major Categories			
Gender	A	C	M	Totals
Male	35.0%	22.5%	5.0%	62.5%
Female	15.0%	15.0%	7.5%	37.5%
Totals	50.0%	37.5%	12.5%	100.0%

Table based on row percentages

	Student Major Categories			
Gender	A	C	M	Totals
Male	56.0%	36.0%	8.0%	100.0%
Female	40.0%	40.0%	20.0%	100.0%
Totals	50.0%	37.5%	12.5%	100.0%

Table based on column percentages

	Student Major Categories			
Gender	A	C	M	Totals
Male	70.0%	60.0%	40.0%	62.5%
Female	30.0%	40.0%	60.0%	37.5%
Totals	100.0%	100.0%	100.0%	100.0%

2.3 The answer depends on the chosen article.

2.4 (a) Because the 29% is based on the sample, it is a statistic.
(b) Because the 58% is based on the sample, it is a statistic.

2.5 (a)

External Agent Category	Frequency	%
Organized criminal group	697	82.98%
Unknown	84	10.00%
Unaffiliated person(s)	34	4.05%
Activist group	17	2.02%
Former employee	8	0.95%
Relative or acquaintance of employee	0	0.00%
Total	840	100.00%

(b) A vast majority of the data breaches are the results of organized criminal group.

2.6 (a)

Region	Oil Consumption (millions of barrels a day)	Percentag
Iran	3.53	4.00%
Saudi Arabia	9.34	10.58%
Other OPEC countries	22.87	25.91%
Non-OPEC countries	52.52	59.51%
Total	88.26	100.00%

(b) More than half the oil produced is from non-OPEC countries. More than 25% is produced by OPEC countries other than Iran and Saudi Arabia..

2.7 (a)

Brand	Frequency	Percentage
Apple	161	40.25%
HP	77	19.25%
Dell	81	20.25%
Toshiba	22	5.50%
Sony	10	2.50%
Other	49	12.25%
Total	400	100.00%

(b) Apple is the hottest brand among millennials, followed by Dell and HP.

2.8 (a) Table of total percentages

ENJOY SHOPPING FOR CLOTHING FOR YOURSELF	GENDER		
	Male	Female	Total
Yes	22%	25%	47%
No	28%	25%	53%
Total	50%	50%	100%

Table of row percentages

ENJOY SHOPPING FOR CLOTHING FOR YOURSELF	GENDER		
	Male	Female	Total
Yes	46%	54%	100%
No	53%	47%	100%
Total	50%	50%	100%

Table of column percentages

ENJOY SHOPPING FOR CLOTHING FOR YOURSELF	GENDER		
	Male	Female	Total
Yes	44%	51%	47%
No	56%	49%	53%
Total	100%	100%	100%

(b) A higher percentage of females enjoy shopping for clothing for themselves.

2.9 (a)

Table of total percentages:

	Shift		
	Day	Evening	
Nonconforming	1.6%	2.4%	4%
Conforming	65.4%	30.6%	96%
Total	67%	33%	100%

Table of row percentages:

	Shift		
	Day	Evening	
Nonconforming	40%	60%	100%
Conforming	68%	32%	100%
Total	67%	33%	100%

Table of column percentages:

	Shift		
	Day	Evening	
Nonconforming	2%	7%	4%
Conforming	98%	93%	96%
Total	100%	100%	100%

(b) The row percentages allow us to block the effect of disproportionate group size and show us that the pattern for day and evening tests among the nonconforming group is very different from the pattern for day and evening tests among the conforming group. Where 40% of the nonconforming group was tested during the day, 68% of the conforming group was tested during the day.

(c) The director of the lab may be able to cut the number of nonconforming tests by reducing the number of tests run in the evening, when there is a higher percent of tests run improperly.

2.10 Social recommendations had very little impact on correct recall. Those who arrived at the link from a recommendation had a correct recall of 73.07% as compared to those who arrived at the link from browsing who had a correct recall of 67.96%.

2.11 Ordered array: 63 64 68 71 75 88 94

2.12 Ordered array: 73 78 78 78 85 88 91

2.13 (a) $(2+4)/89 = 6.74\%$ of small businesses pay less than 26% of the employee monthly health-care premium.

(b) $(16+21)/89 = 41.57\%$ of small businesses pay between 26% and 75% of the employee monthly health-care premium.

(c) $(23+23)/89 = 51.69\%$ of small businesses pay more than 75% of the employee monthly health-care premium.

2.14 (a) 0 but less than 5 million, 5 million but less than 10 million, 10 million but less than 15 million, 15 million but less than 20 million, 20 million but less than 25 million, 25 million but less than 30 million.

(b) 5 million

(c) 2.5 million, 7.5 million, 12.5 million, 17.5 million, 22.5 million, and 27.5 million.

2.15 (a) Ordered array: Cost($)121, 126, 128, 130, 140, 159, 160, 160, 160, 161, 162, 169, 171, 174, 178, 184, 196, 207, 208, 212, 213, 221, 223, 226, 241, 242, 259, 306, 338, 339

(b) PHStat output:

Bin Cell	Frequency	Percentage
110 but less than 139.99	4	13.33%
140 but less than 169.99	8	26.67%
170 but less than 199.99	5	16.67%
200 but less than 229.99	7	23.33%
230 but less than 259.99	3	10.00%
260 but less than 289.99	0	0.00%
290 but less than 319.99	1	3.33%
320 but less than 349.99	2	6.67%

(c) The costs of attending a baseball game is concentrating around $200 for twenty of the teams have costs between $140 and $230.

2.16 (a)

Electricity Costs	Frequency	Percentage
$80 to $99	4	8%
$100 to $119	7	14
$120 to $139	9	18
$140 to $159	13	26
$160 to $179	9	18
$180 to $199	5	10
$200 to $219	3	6

(b)

Electricity Costs	*Frequency*	*Percentage*	*Cumulative %*
$99	4	8%	8%
$119	7	14%	22%
$139	9	18%	40%
$159	13	26%	66%
$179	9	18%	84%
$199	5	10%	94%
$219	3	6%	100%

(c) The majority of utility charges are clustered between $120 and $180.

2.17 (a), (b)

Bin	*Frequency*	*Percentage*	*Cumulative %*
-0.00350 but less than -0.00201	13	13.00%	13.00%
-0.00200 but less than -0.00051	26	26.00%	39.00%
-0.00050 but less than 0.00099	32	32.00%	71.00%
0.00100 but less than 0.00249	20	20.00%	91.00%
0.00250 but less than 0.00399	8	8.00%	99.00%
0.004 but less than 0.00549	1	1.00%	100.00%

(c) Yes, the steel mill is doing a good job at meeting the requirement as there is only one steel part out of a sample of 100 that is as much as 0.005 inches longer than the specified requirement.

2.18 (a), (b)

Bin	*Frequency*	*Percentage*	*Cumulative %*
8.310 -- 8.329	3	6.12%	6.12%
8.330 -- 8.349	2	4.08%	10.20%
8.350 -- 8.369	1	2.04%	12.24%
8.370 -- 8.389	4	8.16%	20.41%
8.390 -- 8.409	4	8.16%	28.57%
8.410 -- 8.429	15	30.61%	59.18%
8.430 -- 8.449	7	14.29%	73.47%
8.450 -- 8.469	5	10.20%	83.67%
8.470 -- 8.489	5	10.20%	93.88%
8.490 -- 8.509	3	6.12%	100.00%

(c) All the troughs will meet the company's requirements of between 8.31 and 8.61 inches wide.

2.19 (a),(b)

Strength	*Frequency*	*Percentage*	*Cumulative Percentage*
1500 -- 1549	1	3.33%	3.33%
1550 -- 1599	2	6.67%	10.00%
1600 -- 1649	2	6.67%	16.67%
1650 -- 1699	7	23.33%	40.00%
1700 -- 1749	5	16.67%	56.67%
1750 -- 1799	7	23.33%	80.00%
1800 -- 1849	3	10.00%	90.00%
1850 -- 1899	3	10.00%	100.00%

(c) The strength of all the insulators meets the company's requirement of at least 1500 lbs.

2.20 (a)

Bulb Life (hrs)	*Frequency Manufacturer A*		*Bulb Life (hrs)*	*Frequency Manufacturer B*
650 -- 749	3		750 -- 849	2
750 -- 849	5		850 -- 949	8
850 -- 949	20		950 -- 1049	16
950 -- 1049	9		1050 -- 1149	9
1050 -- 1149	3		1150 -- 1249	5

2.20 cont. (a), (b)

Bulb Life (hrs)	*A*		*B*	
	Percentage	*Cumulative %*	*Percentage*	*Cumulative %*
650 – 749	7.50%	7.50%	.00%	0.00%
750 – 849	12.50%	20.00%	5.00%	5.00%
850 – 949	50.00%	70.00%	20.00%	25.00%
950 – 1049	22.50%	92.50%	40.00%	65.00%
1050 – 1149	7.50%	100.00%	22.50%	87.50%
1150 – 1249	0.00%	100.00%	12.50%	100.00%

(c) Manufacturer B produces bulbs with longer lives than Manufacturer A. The cumulative percentage for Manufacturer B shows 65% of its bulbs lasted less than 1,050 hours, contrasted with 70% of Manufacturer A's bulbs, which lasted less than 950 hours. None of Manufacturer A's bulbs lasted more than 1,149 hours, but 12.5% of Manufacturer B's bulbs lasted between 1,150 and 1,249 hours. At the same time, 7.5% of Manufacturer A's bulbs lasted less than 750 hours, whereas all of Manufacturer B's bulbs lasted at least 750 hours

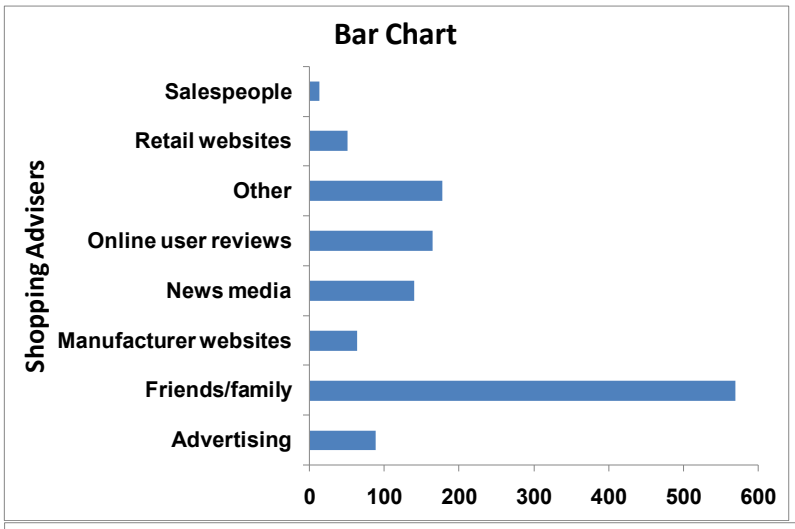
2.21 (a)

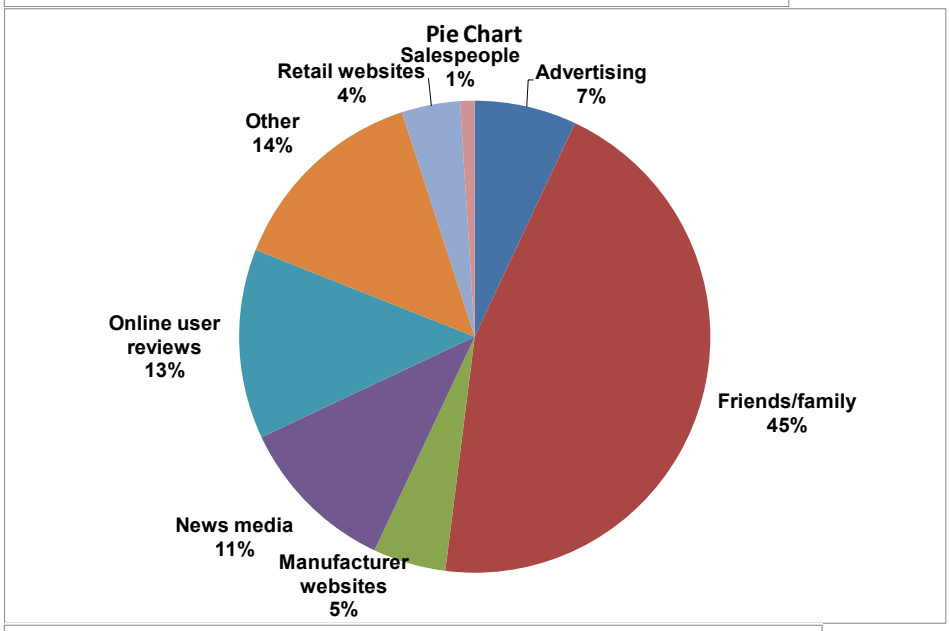
Amount of Soft Drink	Frequency	Percentage
1.850 – 1.899	1	2%
1.900 – 1.949	5	10
1.950 – 1.999	18	36
2.000 – 2.049	19	38
2.050 – 2.099	6	12
2.100 – 2.149	1	2

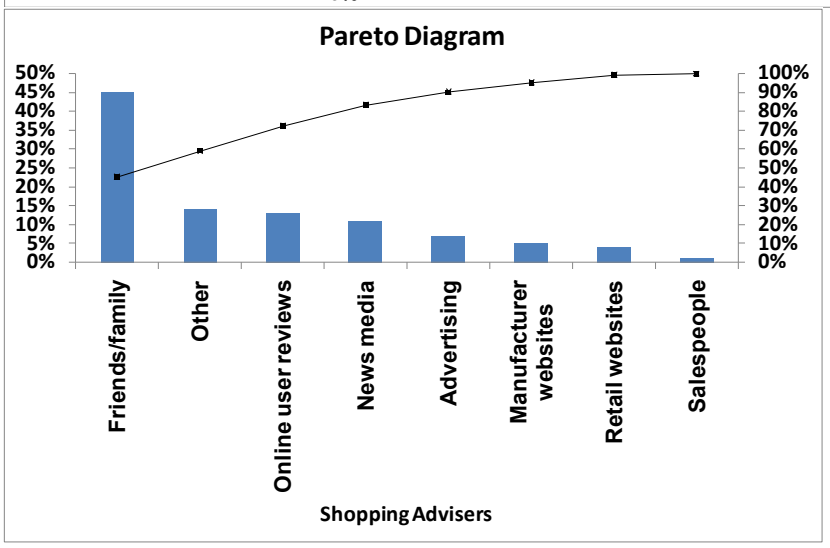
Amount of Soft Drink	Frequency Less Than	Percentage Less Than
1.899	1	2%
1.949	6	12
1.999	24	48
2.049	43	86
2.099	49	98
2.149	50	100

(b) The amount of soft drink filled in the two liter bottles is most concentrated in two intervals on either side of the two-liter mark, from 1.950 to 1.999 and from 2.000 to 2.049 liters. Almost three-fourths of the 50 bottles sampled contained between 1.950 liters and 2.049 liters.

2.22 (a) Note: %s converted to counts. $n = 1264$



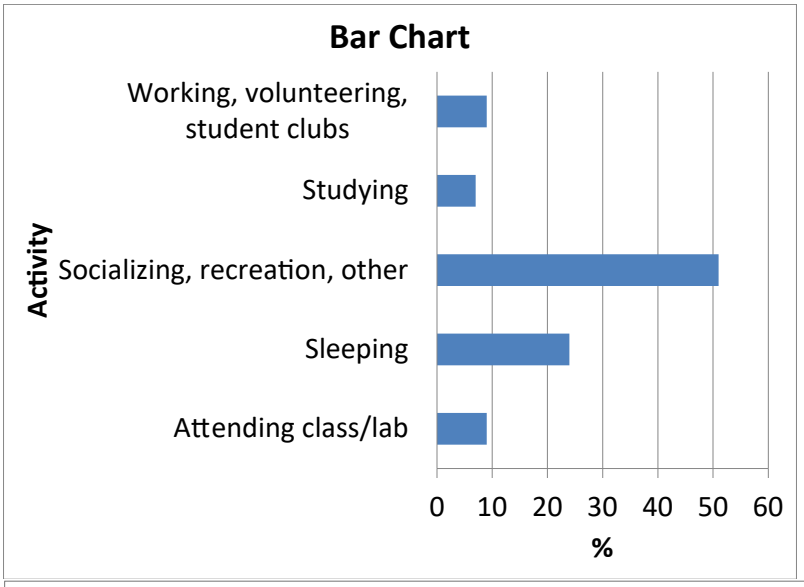


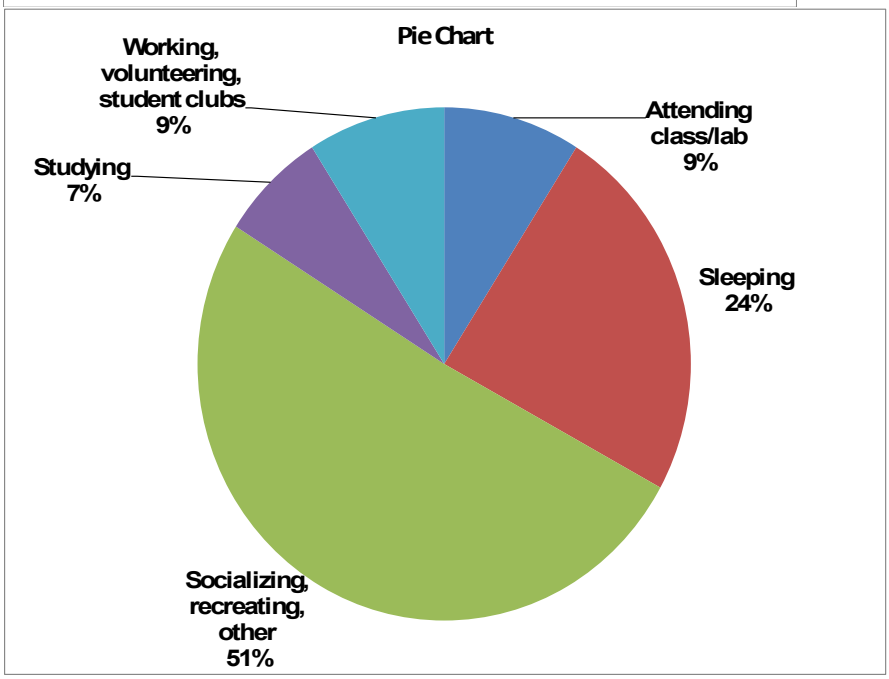


2.22 cont. (b) The Pareto diagram is better than the pie chart to portray these data because it not only sorts the frequencies in descending order, it also provides the cumulative polygon on the same scale.

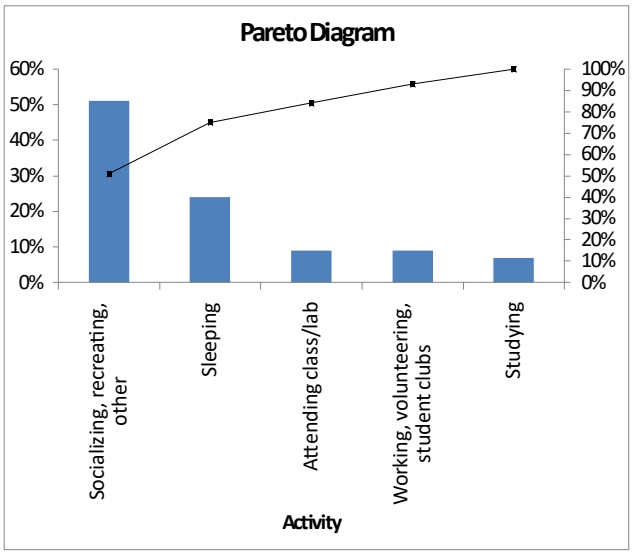
(c) You can conclude that friends/family account for the largest percentage of 45%. When other, news media, and online user reviews are added to friends/family, this accounts for 83%.

2.23 (a)





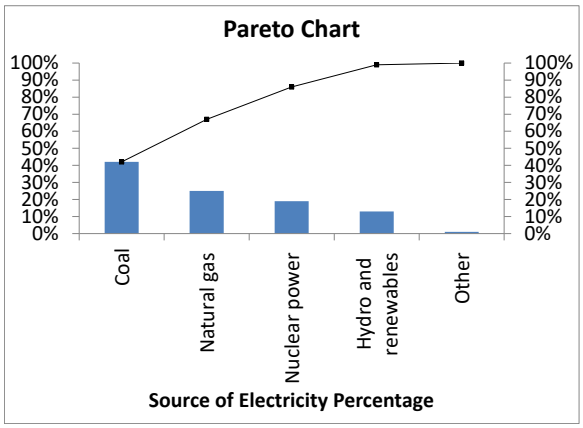
2.23 cont. (a)



(b) The Pareto diagram is better than the pie chart or the bar chart because it not only sorts the frequencies in descending order, it also provides the cumulative polygon on the same scale.

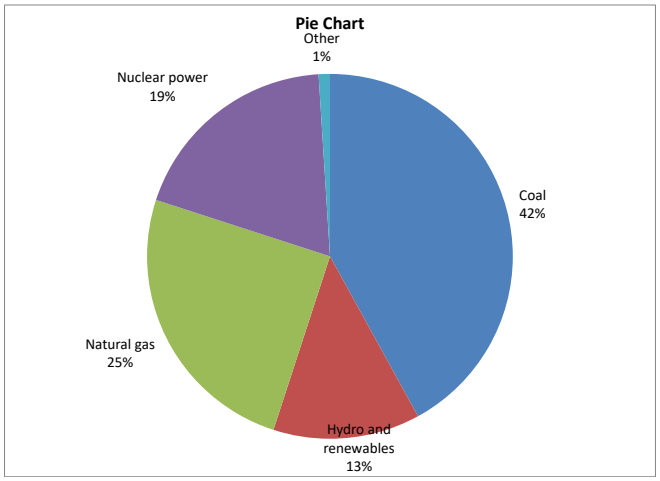
(c) From the Pareto diagram, it is obvious that slightly more than 50% of them were socializing, recreating or performing other activities.

2.24 (a)



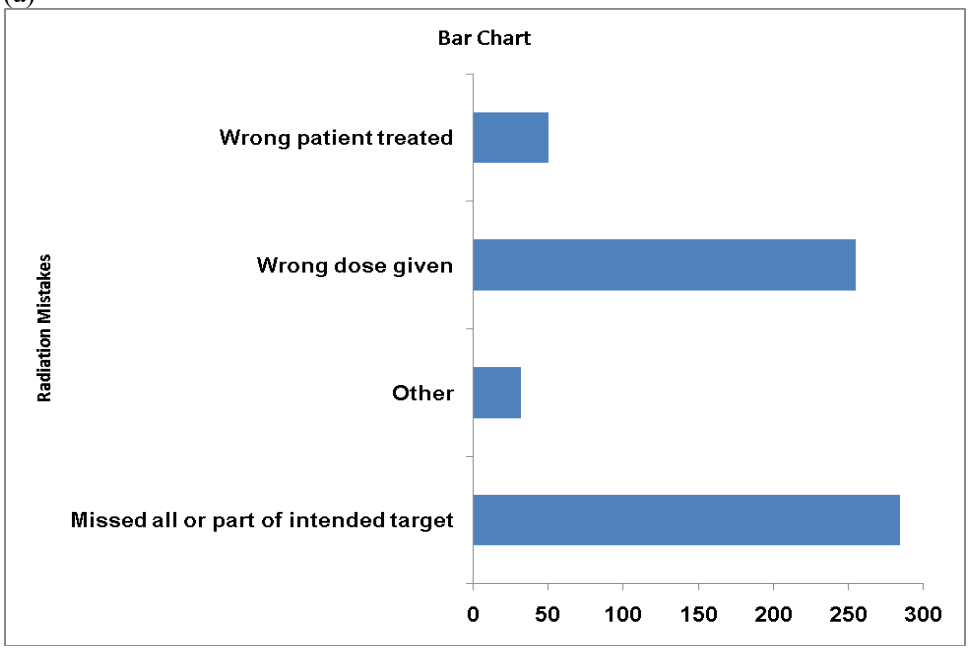
(b) Eighty-six percent of power is derived from coal, nuclear power, or natural gas.

2.24 (c)
cont.

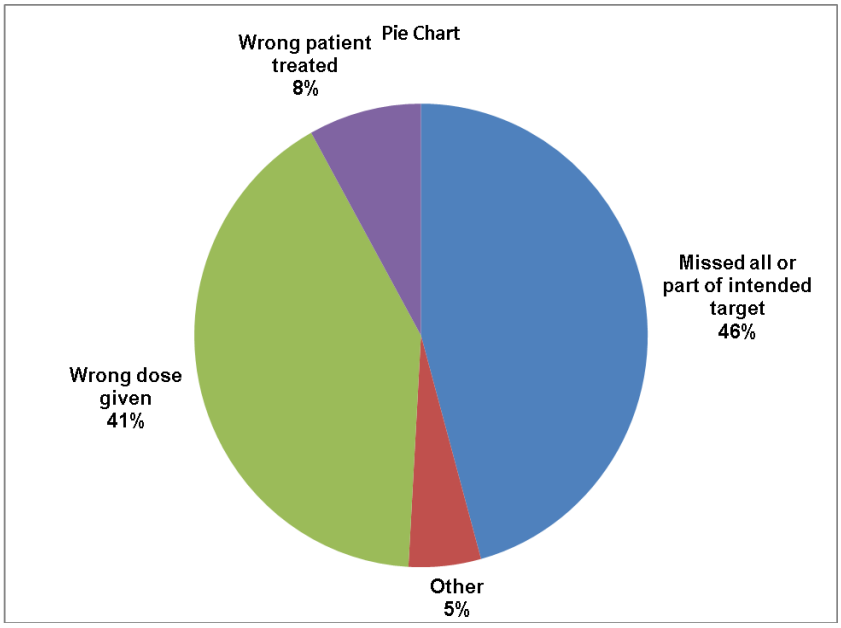


(d) The Pareto diagram is better than the pie chart because it not only sorts the frequencies in descending order, it also provides the cumulative polygon on the same scale.

2.25 (a)



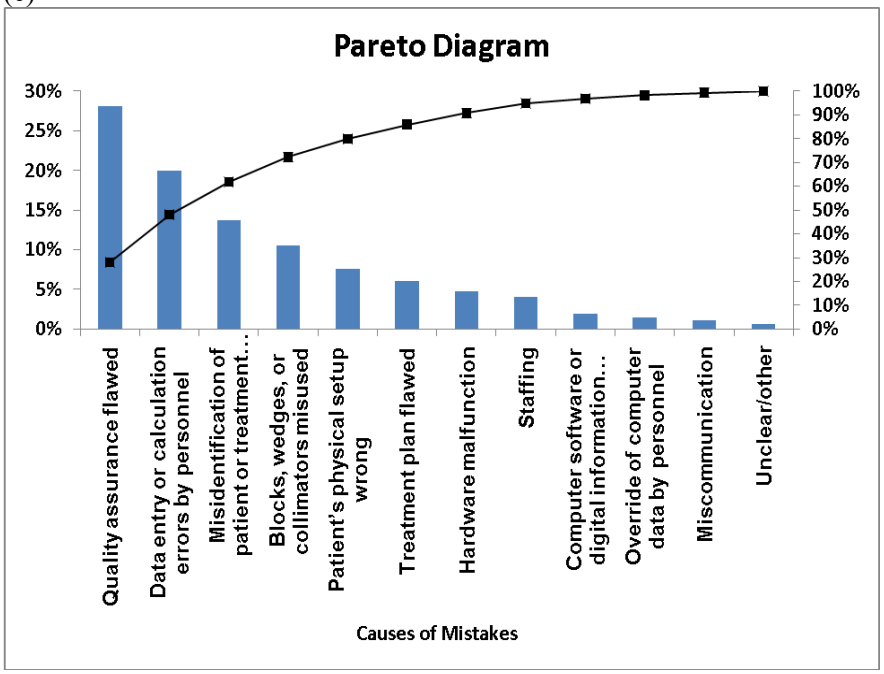
2.25 cont. (a)



(b) The bar chart is more suitable if the purpose is to compare the categories. The pie chart is more suitable if the main objective is to investigate the portion of the whole that is in a particular category. *

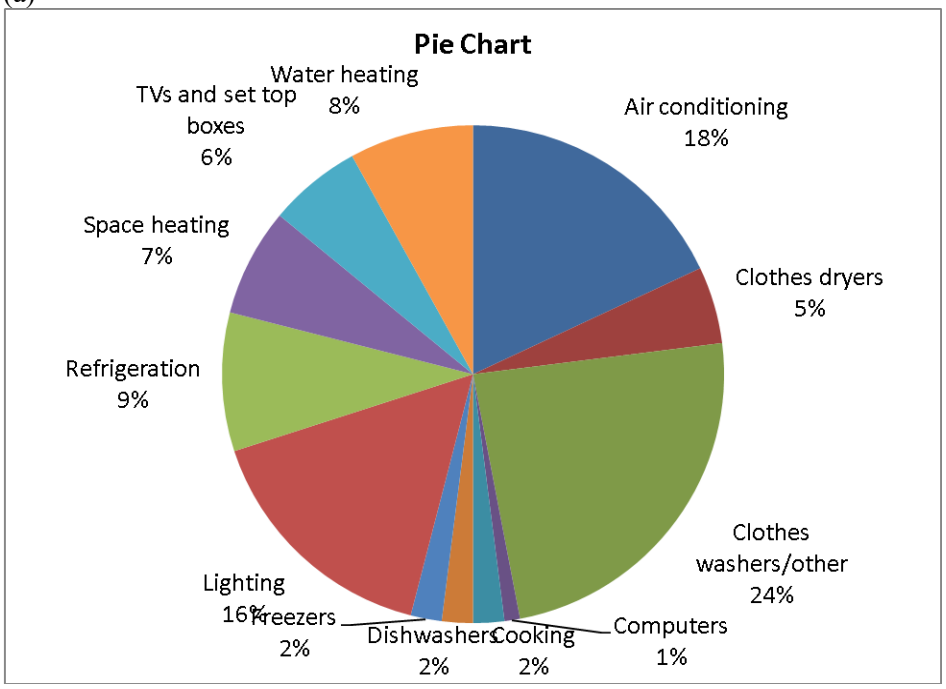
* Note: This is one of the many possible solutions for the question.

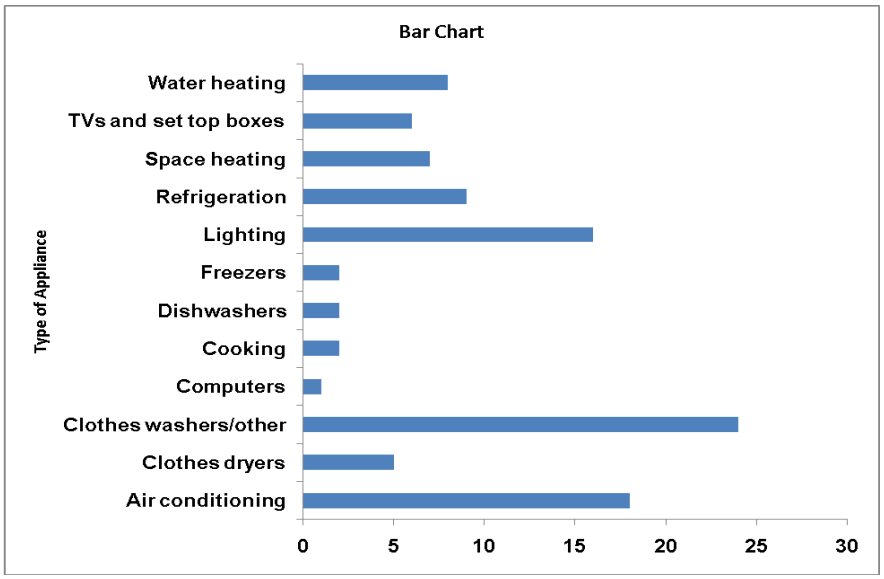
(c)



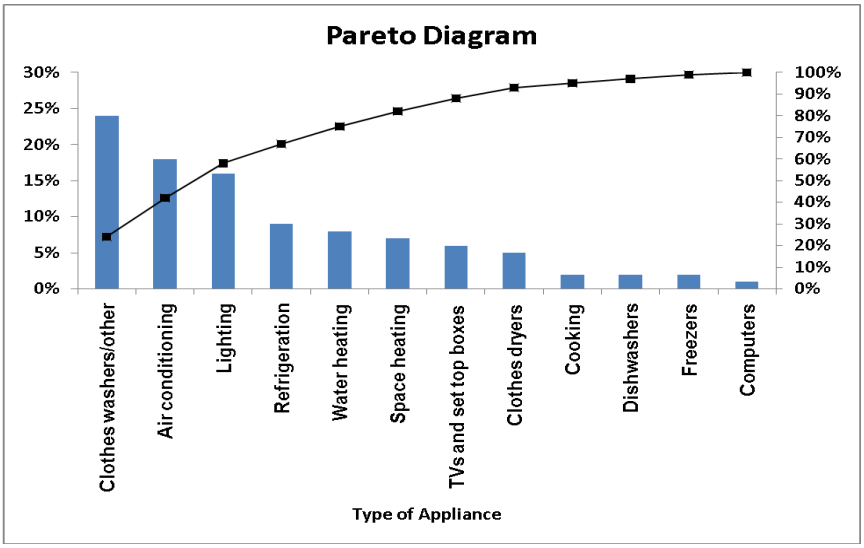
(d) The "vital few" reasons for the causes of mistakes are "Quality assurance flawed", "Data entry or calculation errors by personnel", and "Misidentification of patient or treatment location" which account for more than 60% of the mistakes. The remaining causes are the "trivial many" which make up less than 40% of the mistakes.

2.26 (a)





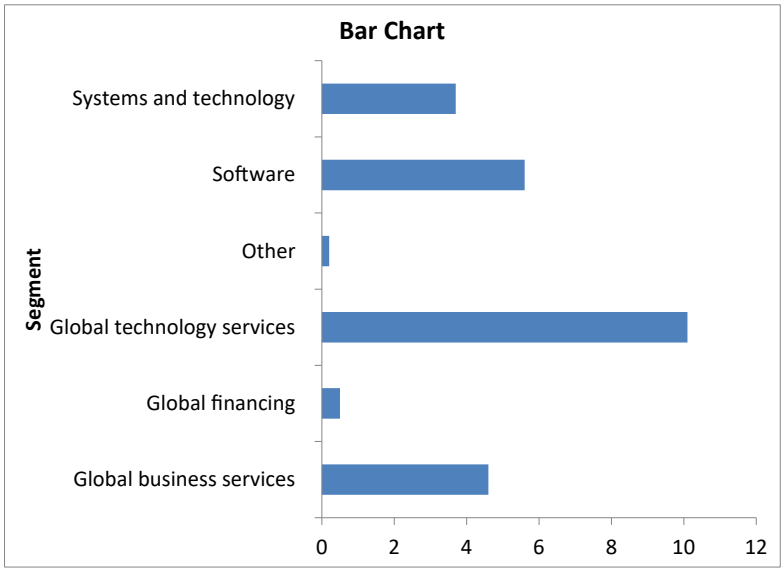
2.26 cont. (a)



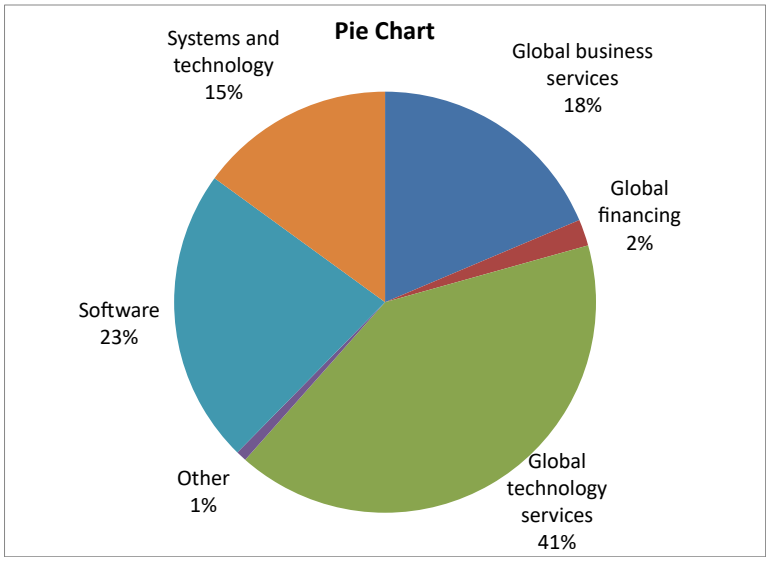
(b) The Pareto diagram is better than the pie chart and bar chart because it not only sorts the frequencies in descending order, it also provides the cumulative polygon on the same scale.

(c) Almost 60% of the residential electricity consumption in the United States is on "Clothes washers/other", "Air conditioning", and "Lighting".

2.27 (a)

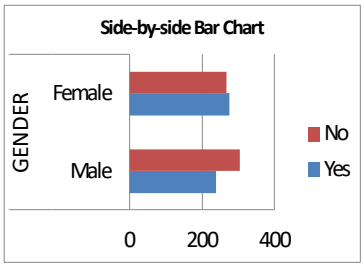


2.27 (a) cont.



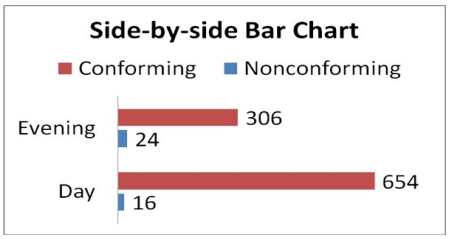
(b) The highest percentage of their revenue comes from Global Technology Services at 41%, followed by Software at 23%, Global Business Services at 18% and Systems and Technology at 15%.

2.28 (a)



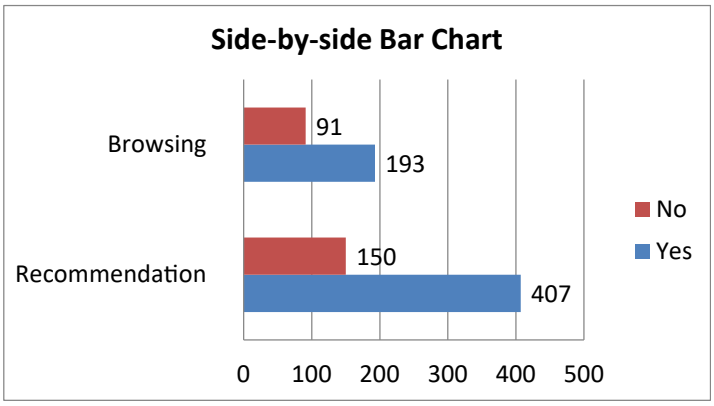
(b) A higher percentage of females enjoy shopping for clothing.

2.29 (a)



(b) The director of the lab may be able to cut the number of nonconforming tests by reducing the number of tests run in the evening, when there is a higher percent of tests run improperly.

2.30 (a)



(b) Social recommendations had very little impact on correct recall.

2.31 Stem-and-leaf of Finance Scores

5	34
6	9
7	4
9	38

2.32 Ordered array: 50 74 74 76 81 89 92

2.33 (a) Ordered array: 9.1 9.4 9.7 10.0 10.2 10.2 10.3 10.8 11.1 11.2
11.5 11.5 11.6 11.6 11.7 11.7 11.7 12.2 12.2 12.3
12.4 12.8 12.9 13.0 13.2

(b) The stem-and-leaf display conveys more information than the ordered array. We can more readily determine the arrangement of the data from the stem-and-leaf display than we can from the ordered array. We can also obtain a sense of the distribution of the data from the stem-and-leaf display.

(c) The most likely gasoline purchase is between 11 and 11.7 gallons.

(d) Yes, the third row is the most frequently occurring stem in the display and it is located in the center of the distribution.

2.34 (a)

Statistics	
Sample Size	30
Mean	197.1333
Median	181
Std. Deviation	57.66534
Minimum	121
Maximum	339

Stem-and-Leaf Displa

Stem unit 10

12	1 6 8
13	0
14	0
15	9
16	0 0 0 1 2 9
17	1 4 8
18	4
19	6
20	7 8
21	2 3
22	1 3 6
23	
24	1 2
25	9
26	
27	
28	
29	
30	6
31	
32	
33	8 9

(b) The results are concentrated between \$160 and \$178.

2.35 (a) Ordered array: 0.13, 0.17, 0.19, 0.21, 0.26, 0.29, 0.29, 0.33, 0.33, 0.35, 0.35, 0.37, 0.38, 0.39, 0.44, 0.76, 1.14, 1.75

2.35 (b) cont.

Statistics	
Sample Size	18
Mean	0.451667
Median	0.34
Std. Deviation	0.399945
Minimum	0.13
Maximum	1.75

Stem-and-Leaf Display

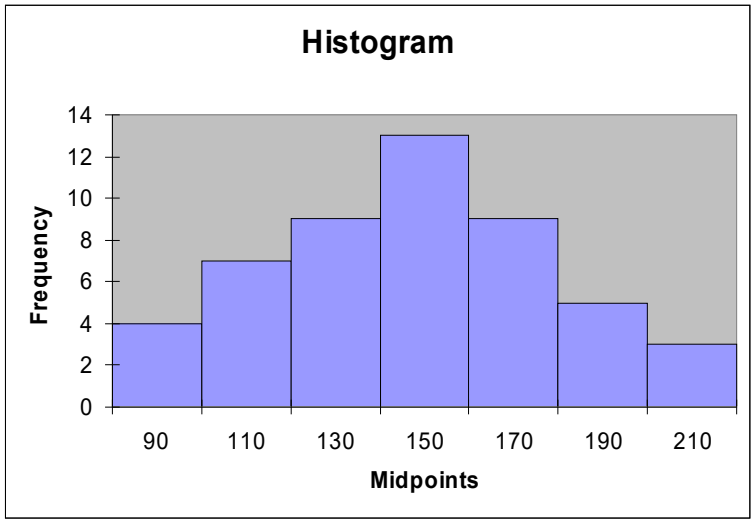
Stem unit 0.1

1	3 7 9
2	1 6 9 9
3	3 3 5 5 7 8 9
4	4
5	
6	
7	6
8	
9	
10	
11	4
12	
13	
14	
15	
16	
17	5

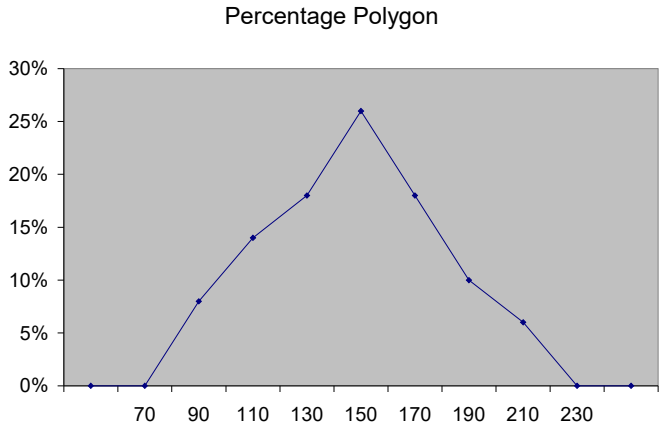
(c) The stem-and-leaf display conveys more information than the ordered array. We can more readily determine the arrangement of the data from the stem-and-leaf display than we can from the ordered array. We can also obtain a sense of the distribution of the data from the stem-and-leaf display.

(d) The cost of chocolate chip cookies is concentrated between \$0.13 and \$0.39.

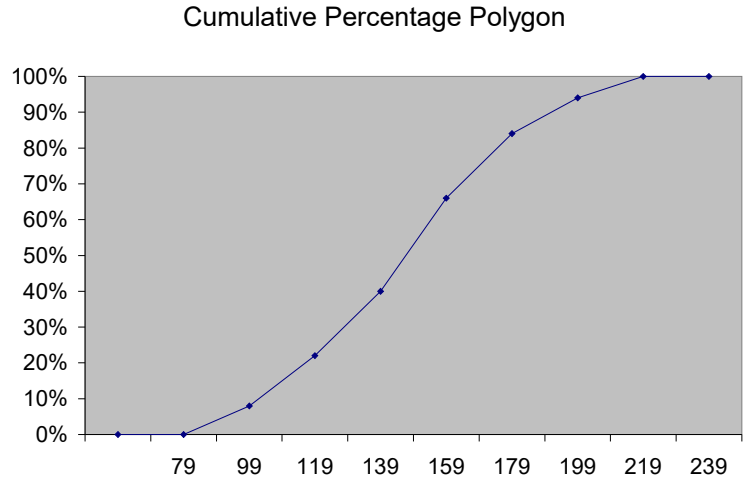
2.36 (a)



2.36 (a)
cont.



(b)

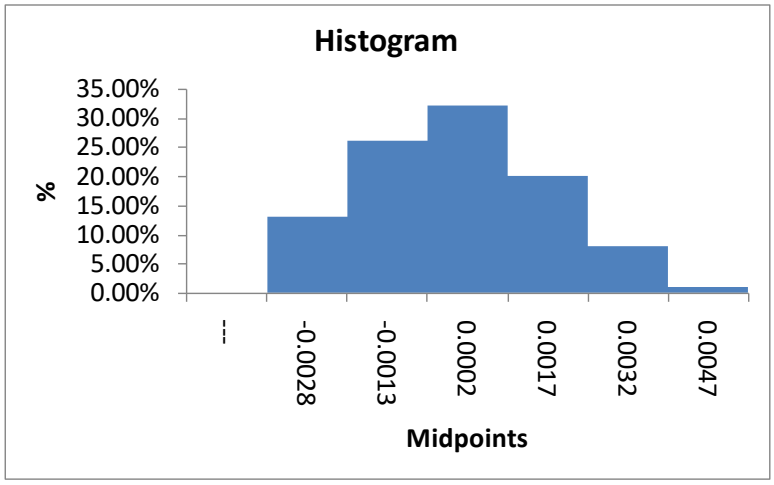


(c) The majority of utility charges are clustered between $120 and $180.

2.37 The costs of attending a baseball game is concentrating around $170 for nine of the teams. There are a few outliers in the right tail with two teams having a cost higher than $320.

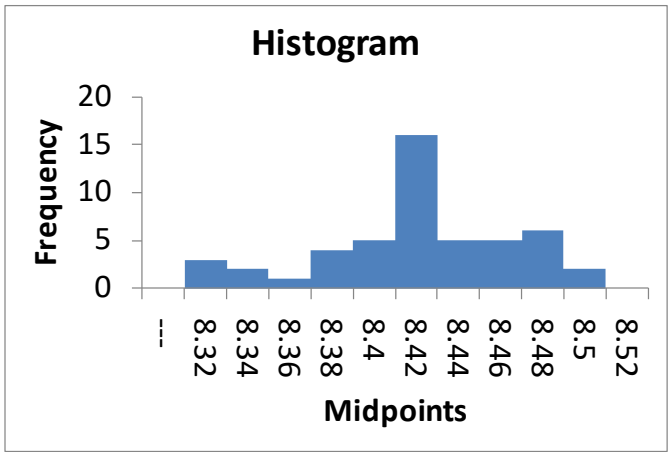
2.38 Property taxes seem concentrated between $1,000 and $1,400 and also between $600 and $800 per capita. There were more states with property taxes per capita below $1,500 than above $1,500.

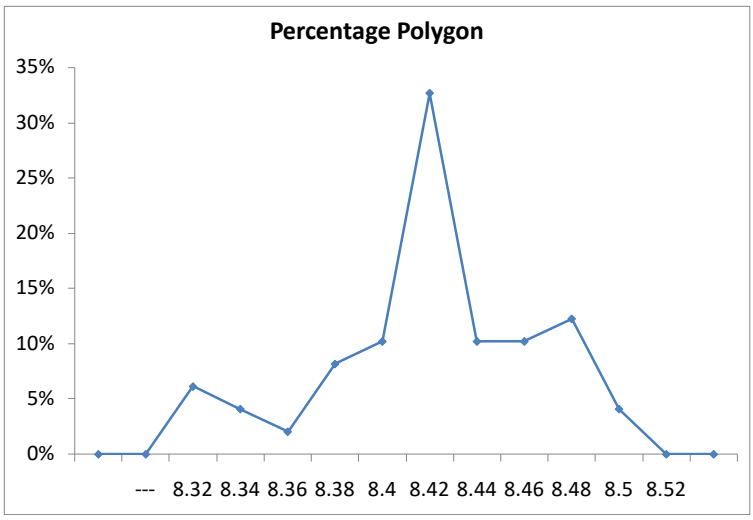
2.39 (a)



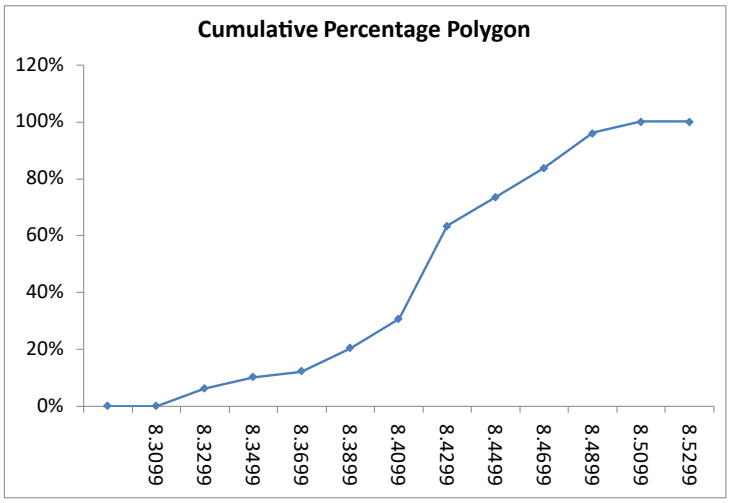
(b) Yes, the steel mill is doing a good job at meeting the requirement as there is only one steel part out of a sample of 100 that is as much as 0.005 inches longer than the specified requirement.

2.40 (a)



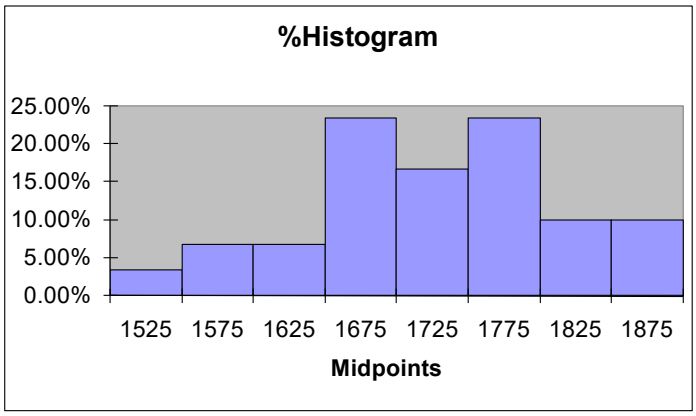


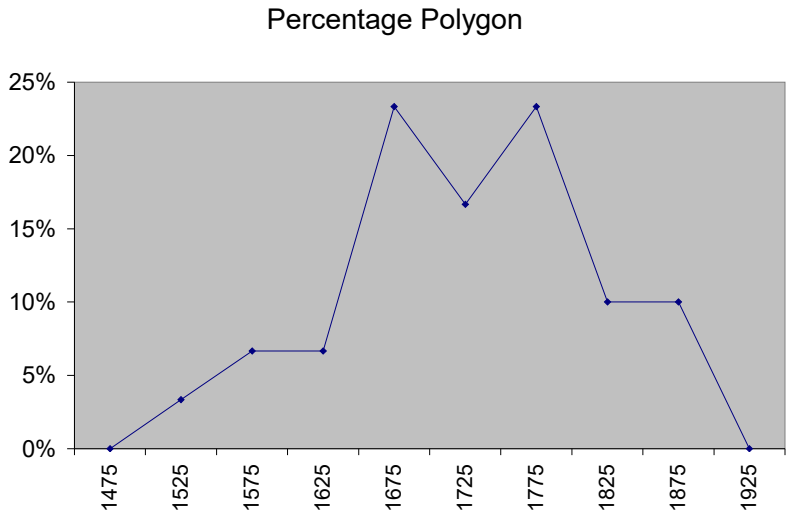
2.40 (b) cont.



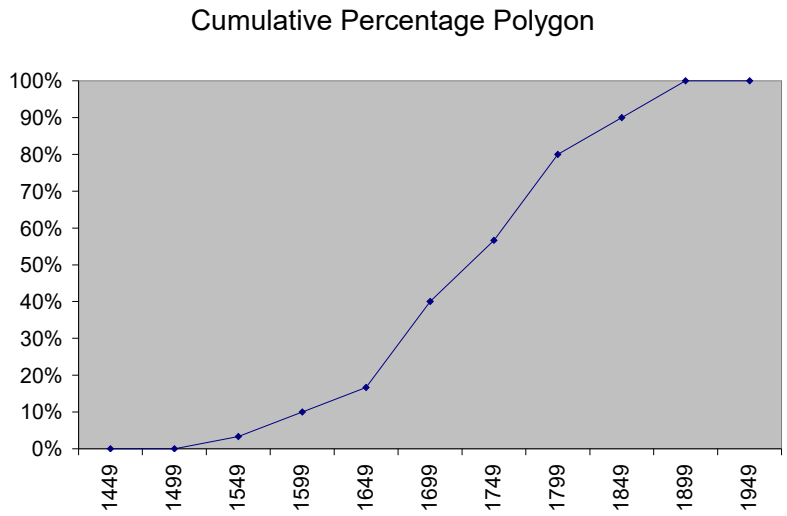
(c) All the troughs will meet the company's requirements of between 8.31 and 8.61 inches wide.

2.41 (a)



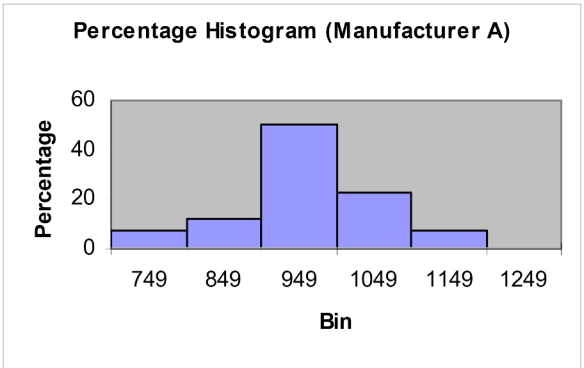


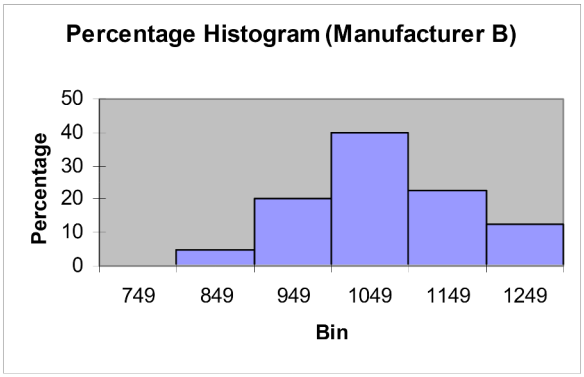
2.41 (b) cont.



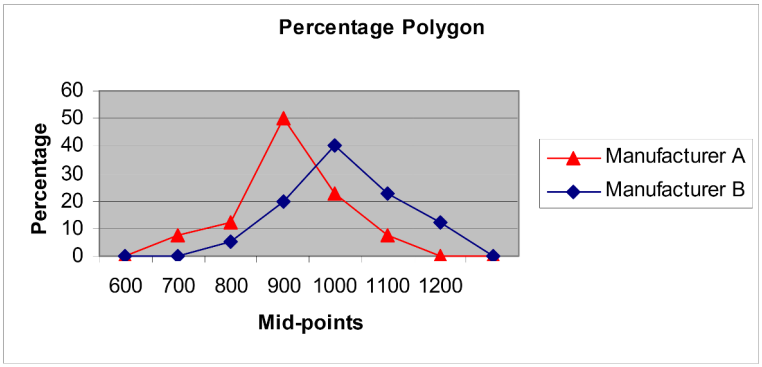
(c) The strength of all the insulators meets the company's requirement of at least 1500 lbs.

2.42 (a)

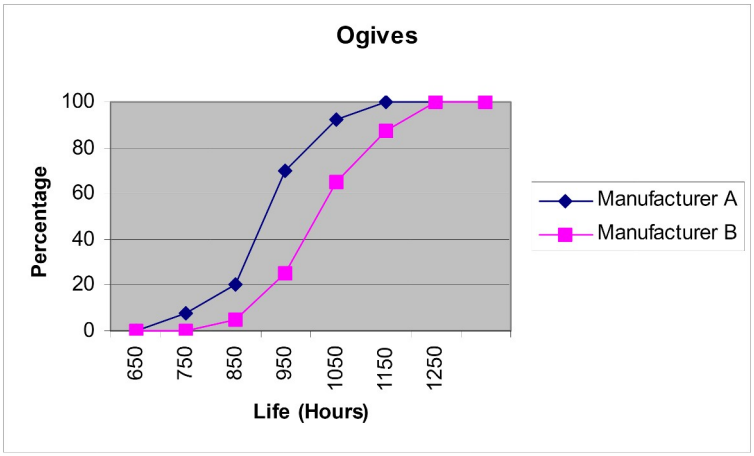




2.42 cont. (a)

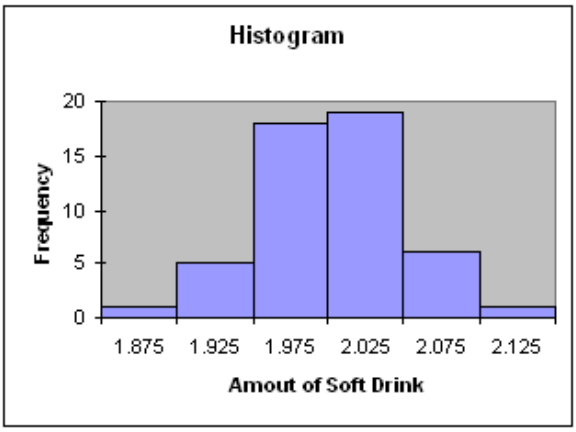


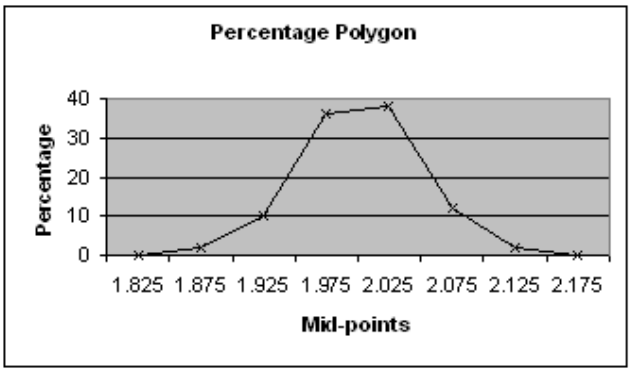
(b)



(c) Manufacturer B produces bulbs with longer lives than Manufacturer A. The cumulative percentage for Manufacturer B shows 65% of their bulbs lasted 1049 hours or less contrasted with 70% of Manufacturer A's bulbs which lasted 949 hours or less. None of Manufacturer A's bulbs lasted more than 1149 hours, but 12.5% of Manufacturer B's bulbs lasted between 1150 and 1249 hours. At the same time, 7.5% of Manufacturer A's bulbs lasted less than 750 hours, while all of Manufacturer B's bulbs lasted at least 750 hours.

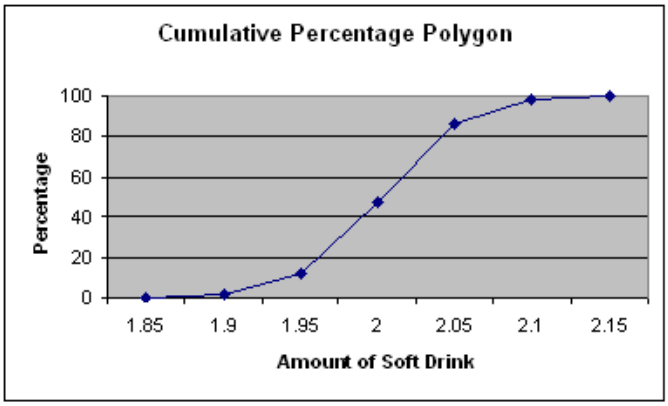
2.43 (a)





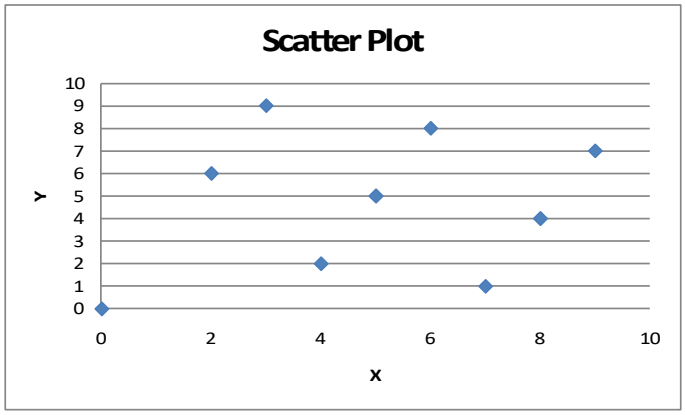
(b)

Amount of Soft Drink	Frequency Less Than	Percentage Less Than
1.899	1	2%
1.949	6	12
1.999	24	48
2.049	43	86
2.099	49	98
2.149	50	100



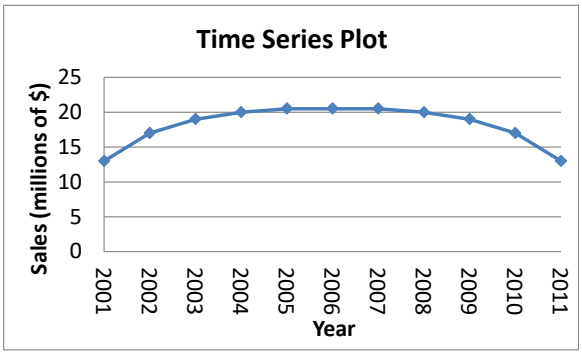
(c) The amount of soft drink filled in the two liter bottles is most concentrated in two intervals on either side of the two-liter mark, from 1.950 to 1.999 and from 2.000 to 2.049 liters. Almost three-fourths of the 50 bottles sampled contained between 1.950 liters and 2.049 liters.

2.44 (a)



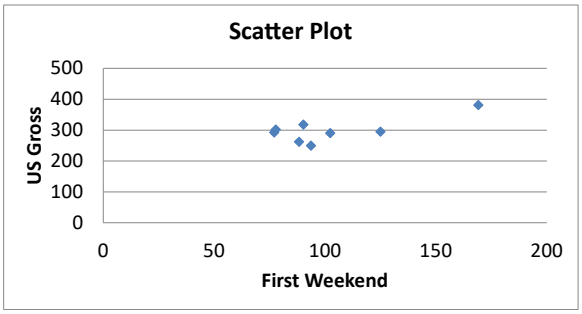
(b) There is no relationship between X and Y.

2.45 (a)

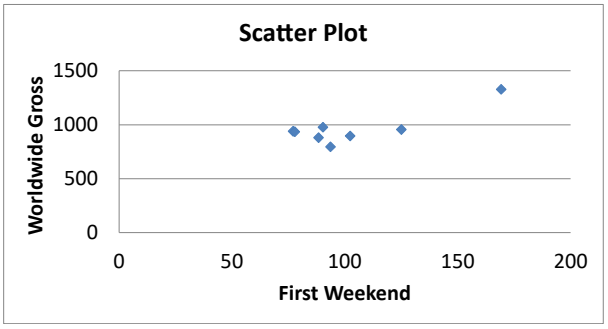


(b) Annual sales appear to be increasing in the earlier years before 2005 but start to decline after 2007.

2.46 (a)

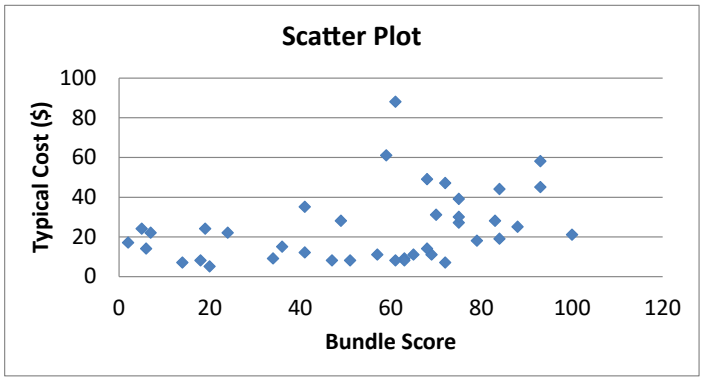


(b)



2.46 cont. (c) There appears to be a linear relationship between the first weekend gross and either the U.S. gross or the worldwide gross of Harry Potter movies. However, this relationship is greatly affected by the results of the last movie, *Deathly Hallows*, *Part II*.

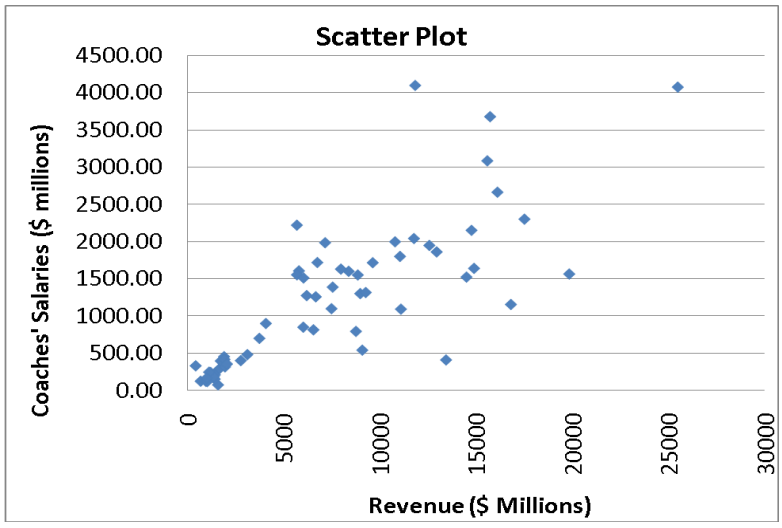
2.47 (a)



(b) There appears to be a positive relationship between Bundle score and typical cost.

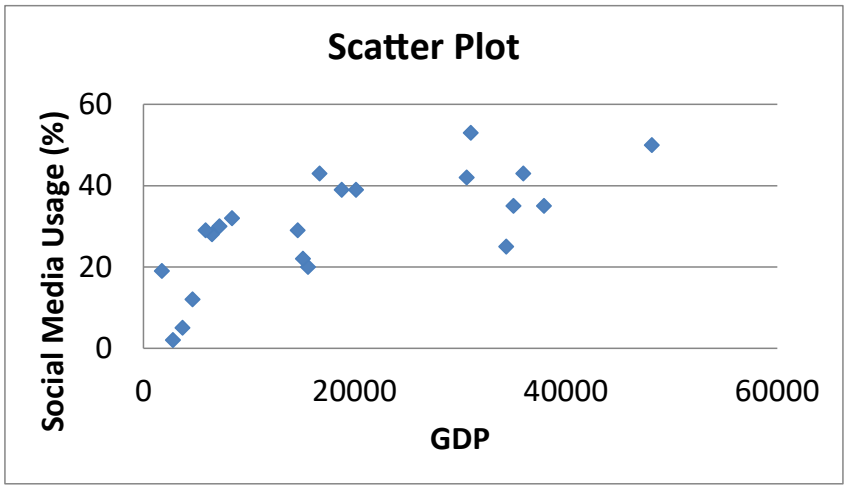
2.48 (a) Yes, schools with higher revenues will also have higher coaches' salaries.

(b)



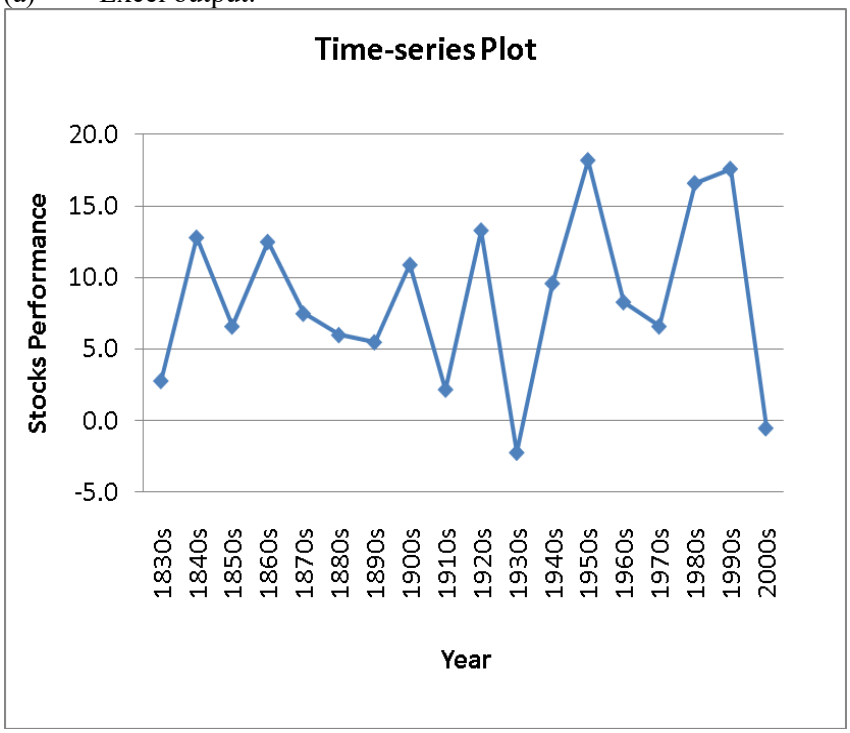
(c) There appears to be a positive relationship between coaches' salary and revenue. Yes, this is borne out by the data.

2.49 (a)



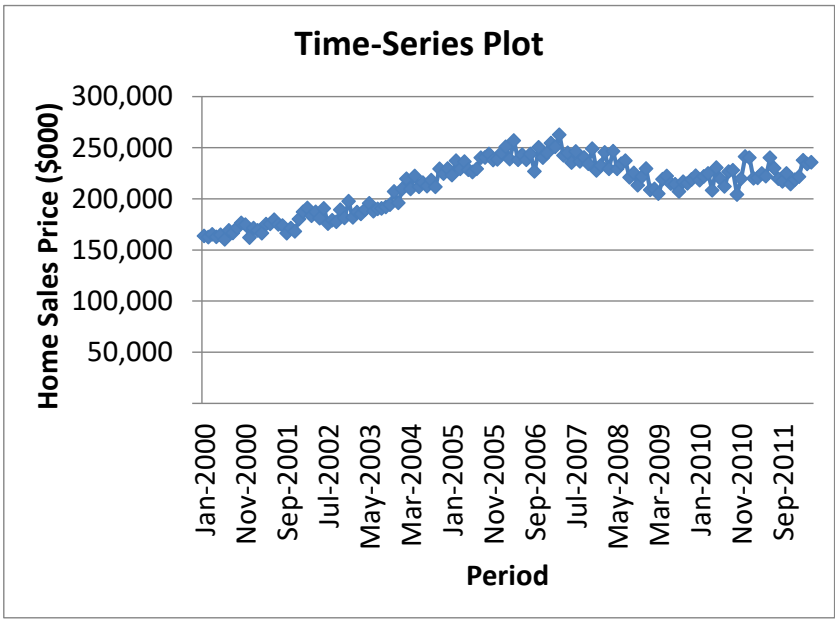
(b) There is a positive relationship between GDP and social media usage.

2.50 (a) Excel output:



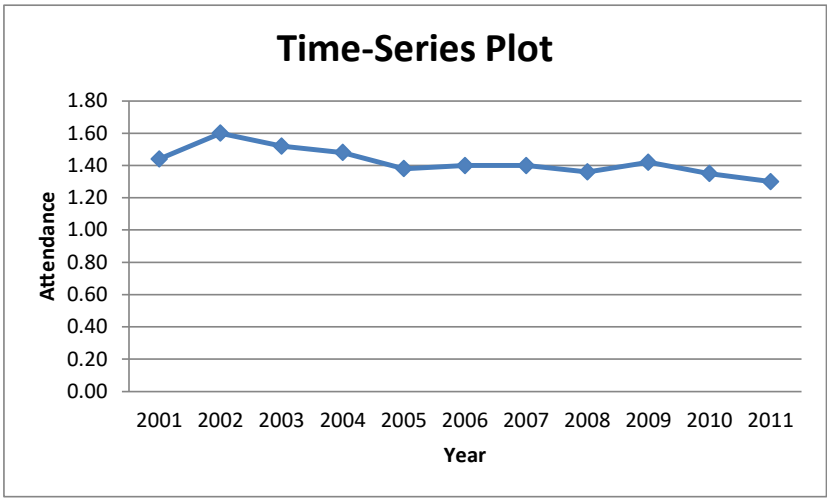
(b) There is a great deal of variation in the returns from decade to decade. Most of the returns are between 5% and 15%. The 1950s, 1980s, and 1990s had exceptionally high returns, and only the 1930s and 2000s had negative returns.

2.51 (a)



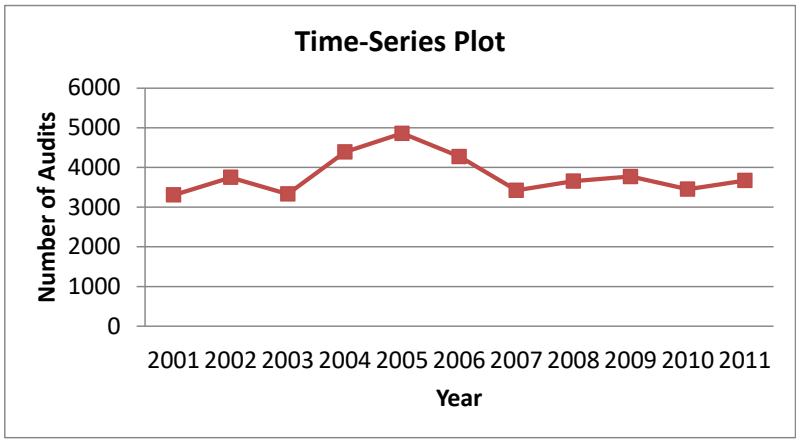
(b) There is an upward trend on the home sales price till 2007 and the sales price started a downward trend from then on till 2009 when it started to trend up again.

2.52 (a)



(b) There was a slight decline in movie attendance between 2001 and 2011. During that time, movie attendance increased from 2001 to 2002 but then after 2004 began decreasing to levels below that in 2001.

2.53 (a)

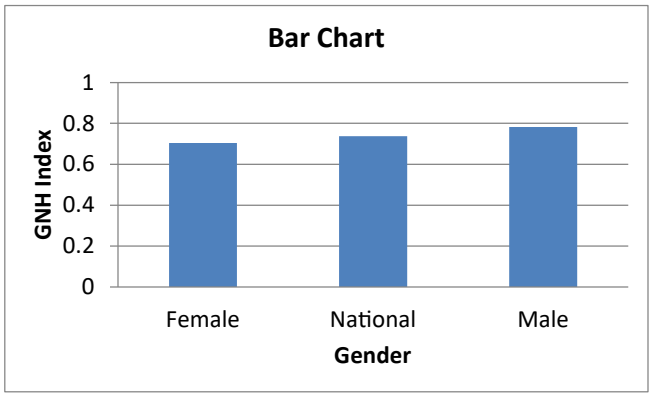


(b) The number of audits increased from 2001 to 2005, then declined back to the 2001 level in 2007 and hover around the same level from then on.

2.57 (a) There is a scale for the vertical axis.

(b) The scale for the vertical axis does not begin at zero.

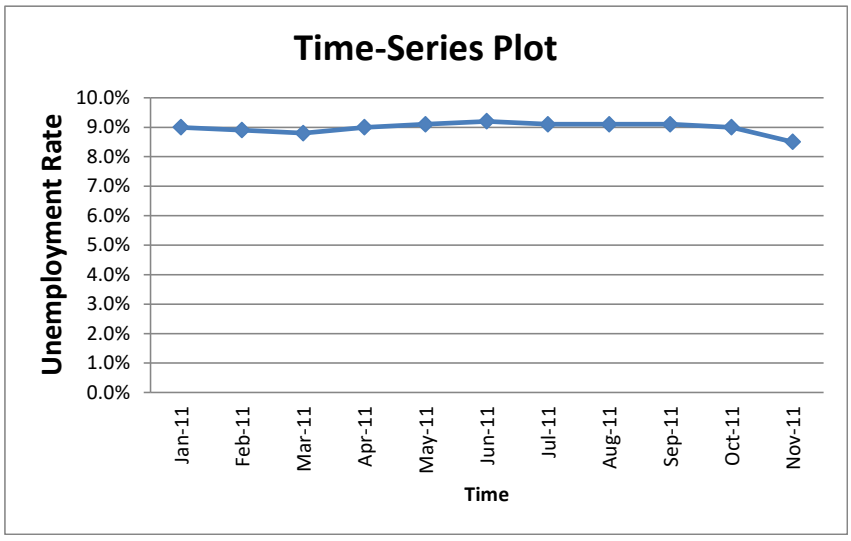
(c)



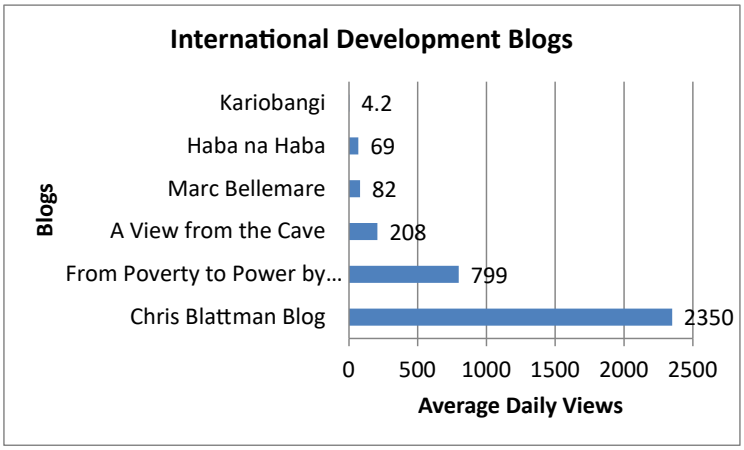
2.58 (a) The line that shows the unemployment rate.

(b) The color under the line is unnecessary.

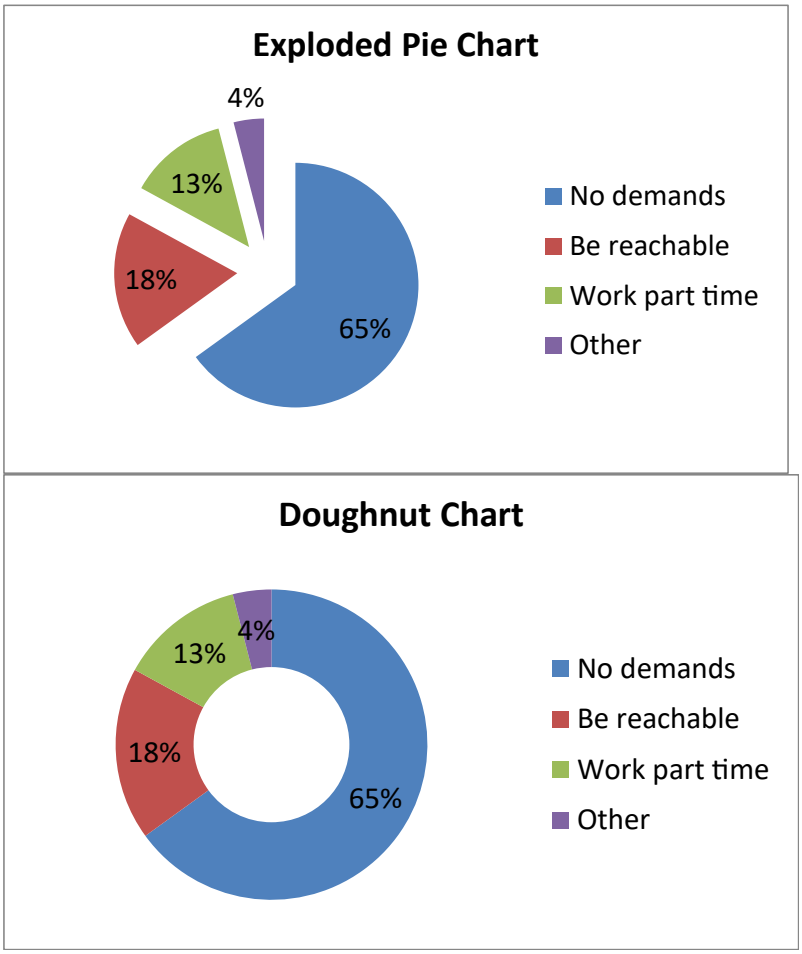
(c)



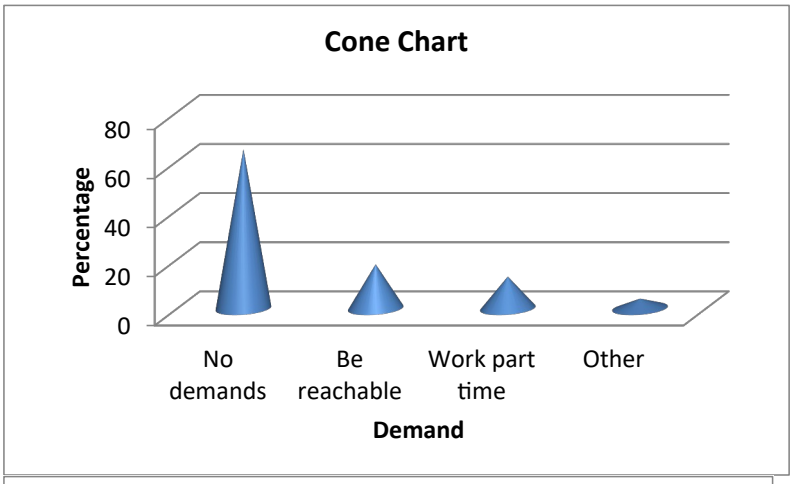
2.59 (a) The graph contains a title.
(b) The axes are not labeled.
(c)

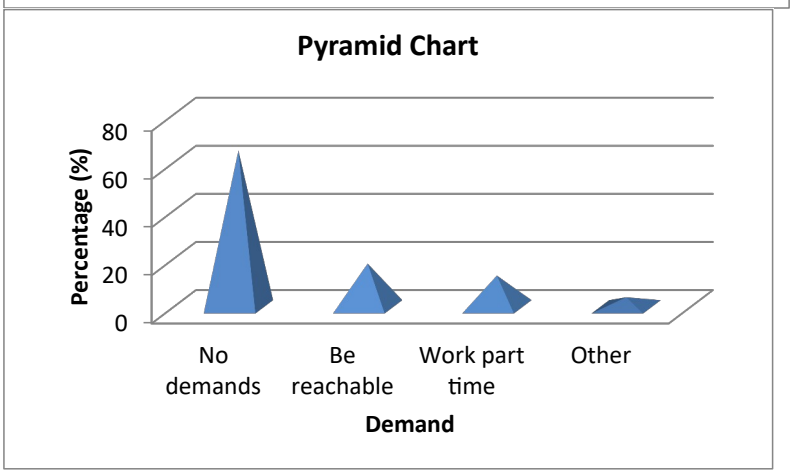


2.61 (a)



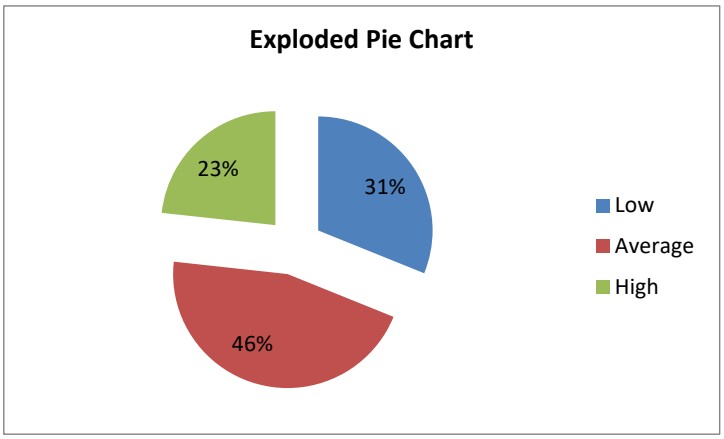
2.61 (a) cont.



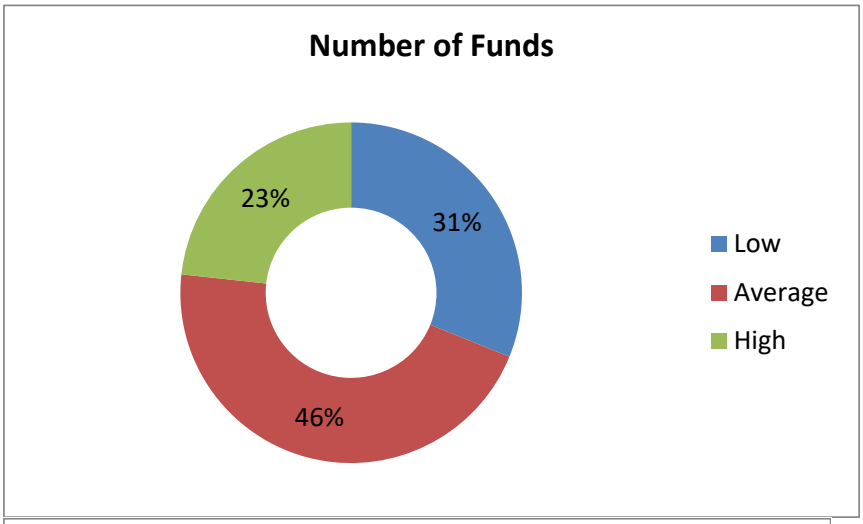


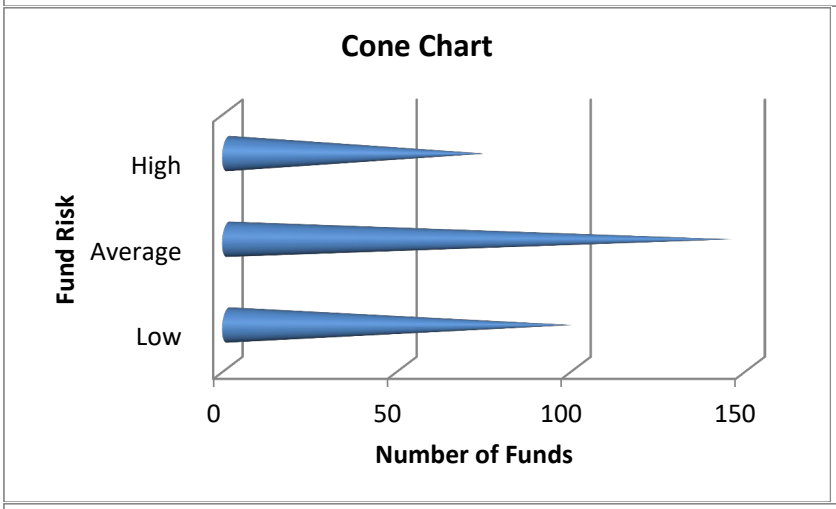
(b) The bar chart and the pie chart should be preferred over the exploded pie chart, doughnut chart, the cone chart and the pyramid chart since the former set is simpler and easier to interpret.

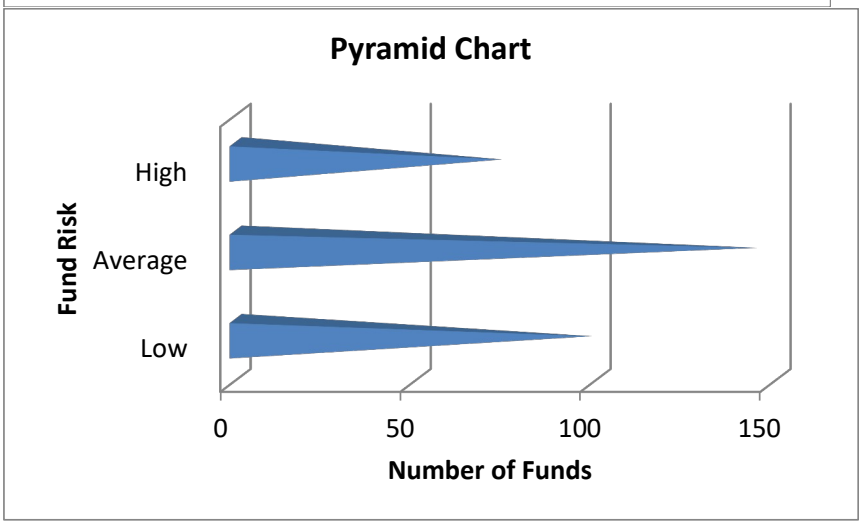
2.62 (a)



2.62 cont. (a)







(b) The bar chart and the pie chart should be preferred over the exploded pie chart, doughnut chart, the cone chart and the pyramid chart since the former set is simpler and easier to interpret.

2.63 (a) Pivotal table of tallies in terms of average:

Average of 3YrReturn%	Column Labels			
Row Labels	Average	High	Low	Grand Total
Growth	**22.74**	**26.75**	**18.54**	**22.44**
Large	21.70	36.23	17.87	21.04
Mid-Cap	22.70	26.34	19.72	22.71
Small	25.06	24.36	27.63	24.77
Value	**18.87**	**26.72**	**17.34**	**20.42**
Large	18.08		16.25	17.08
Mid-Cap	22.04	26.13	21.80	23.92
Small	20.91	27.03	22.64	26.03
Grand Total	**21.89**	**26.74**	**18.09**	**21.84**

(b) There are 8 large cap growth funds with high risk and the summary statistics of their 3-year return are given below:

3YrReturn%	
Mean	36.23375
Standard Error	6.445663
Median	28.11
Mode	#N/A
Standard Deviation	18.23109
Sample Variance	332.3726
Kurtosis	-1.90578
Skewness	0.551101
Range	44.45
Minimum	18.46
Maximum	62.91
Sum	289.87
Count	8

The average 3-year return is 36.2338% with a standard deviation of 18.2311%. The median is lower than the mean at 28.11%. The lowest return is 18.46% while the highest is 62.91% which yields a range of 44.45%.

2.64 (a) Pivotal table of tallies in terms of counts:

Count of 3YrReturn%	Star Rating					
Type	Five	Four	One	Three	Two	Grand Total
Growth	**118**	**30**	**6**	**48**	**21**	**223**
Large	51	14	3	25	10	103
Mid-Cap	37	9		13	7	66
Small	30	7	3	10	4	54
Value	**50**	**16**	**2**	**17**	**10**	**95**
Large	31	10	1	8	5	55
Mid-Cap	10	4		3	2	19
Small	9	2	1	6	3	21
Grand Total	**168**	**46**	**8**	**65**	**31**	**318**

2.64 cont. (a) Pivotal table of tallies in terms of % of grand total:

Count of 3YrReturn%	Star Rating					
Type	Five	Four	One	Three	Two	Grand Total
Growth	**37.11%**	**9.43%**	**1.89%**	**15.09%**	**6.60%**	**70.13%**
Large	16.04%	4.40%	0.94%	7.86%	3.14%	32.39%
Mid-Cap	11.64%	2.83%	0.00%	4.09%	2.20%	20.75%
Small	9.43%	2.20%	0.94%	3.14%	1.26%	16.98%
Value	**15.72%**	**5.03%**	**0.63%**	**5.35%**	**3.14%**	**29.87%**
Large	9.75%	3.14%	0.31%	2.52%	1.57%	17.30%
Mid-Cap	3.14%	1.26%	0.00%	0.94%	0.63%	5.97%
Small	2.83%	0.63%	0.31%	1.89%	0.94%	6.60%
Grand Total	**52.83%**	**14.47%**	**2.52%**	**20.44%**	**9.75%**	**100.00%**

(b) Patterns of star rating conditioned on market cap:
For the growth funds as a group, most are rated as five-star, followed by three-star, four-star, two-star and one-star. The pattern of star rating is the same across the different market cap within the growth funds with most of the funds receiving a five-star rating, followed by three-star, four-star, two-star and one-star.
The pattern for value funds as a group is the same as the growth funds as a group. However, the pattern across the different market cap is slightly different with most of large and mid-cap funds receiving a five-star rating, followed by four-star, three-star, two-star and one-star while most of the small-cap funds receive five-star rating, followed by three-star, two-star, four-star and one-star.
Patterns of market cap conditioned on star rating:
Most of the growth funds are large-cap, followed by mid-cap and small-cap. The pattern is similar among the five-star, four-star, three-star and two-star growth funds but among the one-star growth funds, half are large-cap and half are small-cap with no mid-cap.
The largest share of the value funds is large-cap, followed by small-cap and mid-cap. The pattern is similar among the three-star and two-star value funds. Among the five-star value funds, most are large-cap, followed by mid-cap and then small-cap while half of the one-star value funds are large-cap and half are small-cap with no mid-cap.

(c) Pivotal table of the average 3-year return for each type, market cap and rating.

Average of 3YrReturn%	Star Rating					
Type	Five	Four	One	Three	Two	Grand Total
Growth	**22.6507**	**24.3170**	**19.4017**	**22.5215**	**19.2314**	**22.4376**
Large	21.0080	22.4357	15.4300	21.3636	20.1550	21.0431
Mid-Cap	23.1086	25.0600		22.5731	17.8143	22.7077
Small	24.8783	27.1243	23.3733	25.3490	19.4025	24.7674
Value	**19.8206**	**19.8369**	**23.5700**	**22.3324**	**20.5120**	**20.4245**
Large	17.1623	16.1870	14.9300	18.9538	15.7680	17.0782
Mid-Cap	23.3370	23.7175		27.2100	22.2650	23.9158
Small	25.0700	30.3250	32.2100	24.3983	27.2500	26.0300
Grand Total	**21.8084**	**22.7587**	**20.4438**	**22.4720**	**19.6445**	**21.8362**

2.64 cont. (d) There are 25 large cap growth funds with a rating of three and the summary statistics of their 3-year return are given below:

3YrReturn%	
Mean	21.3636
Standard Error	1.901299
Median	19.23
Mode	#N/A
Standard Deviation	9.506493
Sample Variance	90.37342
Kurtosis	16.29702
Skewness	3.755786
Range	50.97
Minimum	11.94
Maximum	62.91
Sum	534.09
Count	25

The average 3-year return is 21.3636% with a standard deviation of 9.5065%. The median is lower than the mean at 19.23%. The lowest return is 11.94% while the highest is 62.91% which yields a range of 50.97%.

2.65 (a) Pivotal table of tallies in terms of counts:

Count of 3YrReturn%	Star Rating					
Market Cap	Five	Four	One	Three	Two	Grand Total
Large	**82**	**24**	**4**	**33**	**15**	**158**
Average	38	6	4	18	6	72
High	4			2	2	8
Low	40	18		13	7	78
Mid-Cap	**47**	**13**		**16**	**9**	**85**
Average	26	7		9	7	49
High	13	1		4	1	19
Low	8	5		3	1	17
Small	**39**	**9**	**4**	**16**	**7**	**75**
Average	15	4		3	2	24
High	21	4	4	13	5	47
Low	3	1				4
Grand Total	**168**	**46**	**8**	**65**	**31**	**318**

2.65 cont. (a) Pivotal table of tallies in terms of % of grand total:

Count of 3YrReturn%	Star Rating					
Market Cap	Five	Four	One	Three	Two	Grand Total
Large	**25.79%**	**7.55%**	**1.26%**	**10.38%**	**4.72%**	**49.69%**
Average	11.95%	1.89%	1.26%	5.66%	1.89%	22.64%
High	1.26%	0.00%	0.00%	0.63%	0.63%	2.52%
Low	12.58%	5.66%	0.00%	4.09%	2.20%	24.53%
Mid-Cap	**14.78%**	**4.09%**	**0.00%**	**5.03%**	**2.83%**	**26.73%**
Average	8.18%	2.20%	0.00%	2.83%	2.20%	15.41%
High	4.09%	0.31%	0.00%	1.26%	0.31%	5.97%
Low	2.52%	1.57%	0.00%	0.94%	0.31%	5.35%
Small	**12.26%**	**2.83%**	**1.26%**	**5.03%**	**2.20%**	**23.58%**
Average	4.72%	1.26%	0.00%	0.94%	0.63%	7.55%
High	6.60%	1.26%	1.26%	4.09%	1.57%	14.78%
Low	0.94%	0.31%	0.00%	0.00%	0.00%	1.26%
Grand Total	**52.83%**	**14.47%**	**2.52%**	**20.44%**	**9.75%**	**100.00%**

(b) Patterns of star rating conditioned on risk:

For the large-cap funds as a group, most are rated as five-star, followed by three-star, four-star, two-star and then one-star. The pattern of star rating is similar among the average-risk large-cap funds. The pattern is different among the high-risk and low-risk large-cap funds. Among the high-risk large-cap funds, most are rated as five-star, followed by equal shares of the three-star and two-star with no four-star or one-star rating. Among the low-risk large-cap funds, most are five-star, followed by four-star, three-star and two-star with no one-star rating.

For the mid-cap funds as a group, most are rated as five-star, followed by three-star, four-star, two-star and then one-star. The pattern of star rating is slightly different among the average-risk and high-risk mid-cap funds with the largest portion of five-star, followed by three-star, equal shares of four-star and two-star with none rated as one-star. Among the low-risk mid-cap funds, most are rated as five-star, followed by four-star, three-star, two-star and no one-star.

For the small-cap funds as a group, most are rated as five-star, followed by three-star, four-star, two-star and then one-star. Among the average-risk small-cap funds, most are five-star, followed by four-star, three-star, two-star and no one-star. Among the high-risk small-cap funds, most are rated as five-star, followed by three-star, two-star, and equal shares of four-star and one-star. Among the low-risk small-cap funds, most are five-star, followed by four-star with none rated as three-star, two-star or one-star.

Patterns of risk conditioned on star rating:

Among the large-cap funds, most are low-risk, followed by average-risk and finally high-risk. The pattern is the same among the five-star, four-star and two-star large-cap funds but among the three-star large-cap funds, most are average-risk followed by low-risk and then high-risk. All of the one-star large-cap funds are rated as average-risk.

Among the mid-cap funds, most are average-risk, followed by high-risk and finally low-risk. The pattern is the same among the five-star and three-star mid-cap funds but among the four-star mid-cap funds, most are average-risk followed by low-risk and then high-risk. There are no one-star mid-cap funds.

2.65 cont. (b) Among the small-cap funds, most are high-risk, followed by average-risk and finally low-risk. The pattern is the same for the five-star small-cap funds. Among the four-star small-cap funds, there are equal shares of average-risk and high-risk with a smallest share of low-risk. Among the three-star and two-star small-cap funds, most are high-risk, followed by average-risk with none rated at low-risk. All of the one-star small-cap funds are rated as high-risk.

(c) Pivotal table of the average 3-year return for each type, market cap and risk.

Average of 3YrReturn%	Star Rating					
Market Cap	Five	Four	One	Three	Two	Grand Total
Large	**19.5541**	**19.8321**	**15.3050**	**20.7794**	**18.6927**	**19.6629**
Average	20.9487	24.1450	15.3050	20.4394	16.9433	20.4404
High	30.3250			47.6800	36.6050	36.2338
Low	17.1523	18.3944		17.1115	15.0743	17.2456
Mid-Cap	**23.1572**	**24.6469**		**23.4425**	**18.8033**	**22.9778**
Average	23.0719	25.5186		22.8467	17.8143	22.6290
High	24.9746	29.8300		30.0600	23.8500	26.2416
Low	20.4813	22.3900		16.4067	20.6800	20.3353
Small	**24.9226**	**27.8356**	**25.5825**	**24.9925**	**22.7657**	**25.1209**
Average	24.9493	27.8025		21.1100	22.1800	24.7142
High	24.7938	28.9625	25.5825	25.8885	23.0000	25.3277
Low	25.6900	23.4600				25.1325
Grand Total	**21.8084**	**22.7587**	**20.4438**	**22.4720**	**19.6445**	**21.8362**

(d) There are 2 large cap funds that are high risk with a rating of three and the summary statistics of their 3-year return are given below:

3YrReturn%	
Mean	47.68
Standard Error	15.23
Median	47.68
Mode	#N/A
Standard Deviation	21.53847
Sample Variance	463.9058
Kurtosis	#DIV/0!
Skewness	#DIV/0!
Range	30.46
Minimum	32.45
Maximum	62.91
Sum	95.36
Count	2

The average 3-year return is 47.68% with a standard deviation of 21.5385%. The median is the same as the mean. The lowest return is 32.45% while the highest is 62.91% which yields a range of 30.46%.

2.66 (a) Pivotal table of tallies in terms of counts:

Count of 3YrReturn%	Star Rating					
Type	Five	Four	One	Three	Two	Grand Total
Growth	**118**	**30**	**6**	**48**	**21**	**223**
Average	60	15	3	24	11	113
High	27	3	3	11	4	48
Low	31	12		13	6	62
Value	**50**	**16**	**2**	**17**	**10**	**95**
Average	19	2	1	6	4	32
High	11	2	1	8	4	26
Low	20	12		3	2	37
Grand Total	**168**	**46**	**8**	**65**	**31**	**318**

Pivotal table of tallies in terms of % of grand total:

Count of 3YrReturn%	Star Rating					
Type	Five	Four	One	Three	Two	Grand Total
Growth	**37.11%**	**9.43%**	**1.89%**	**15.09%**	**6.60%**	**70.13%**
Average	18.87%	4.72%	0.94%	7.55%	3.46%	35.53%
High	8.49%	0.94%	0.94%	3.46%	1.26%	15.09%
Low	9.75%	3.77%	0.00%	4.09%	1.89%	19.50%
Value	**15.72%**	**5.03%**	**0.63%**	**5.35%**	**3.14%**	**29.87%**
Average	5.97%	0.63%	0.31%	1.89%	1.26%	10.06%
High	3.46%	0.63%	0.31%	2.52%	1.26%	8.18%
Low	6.29%	3.77%	0.00%	0.94%	0.63%	11.64%
Grand Total	**52.83%**	**14.47%**	**2.52%**	**20.44%**	**9.75%**	**100.00%**

(b) Patterns of star rating conditioned on risk:

For the growth funds as a group, most are rated as five-star, followed by three-star, four-star, two-star and one-star. The pattern of star rating is the same among the average-risk and low-risk growth funds. The pattern is different among the high-risk growth funds with most rated as five-star, followed by three-star, two-star and finally equal portions of four and one-star.

The pattern for value funds as a group is the same as the growth funds as a group. However, the pattern across the different market cap is different with most of average and high-risk funds receiving a five-star rating, followed by three-star, two-star, four-star and one-star while most of the low-risk funds receiving five-star rating, followed by four-star, three-star, two-star and no one-star.

Patterns of risk conditioned on star rating:

Most of the growth funds are rated as average-risk, followed by low-risk and then high-risk. The pattern is similar among the five-star, four-star, three-star and two-star growth funds but among the one-star growth funds, half are average-risk and half are high-risk with no low-risk.

The largest share of the value funds is rated as low-risk, followed by average-risk and finally high-risk. The pattern is similar among the five-star value funds. Among the four-star value funds, most are low-risk, followed by equal shares of average-risk and high-risk. Among the three-star value funds, most are high-risk, followed by average-risk and finally low-risk. Among the two-star value funds, the low-risk makes up the smallest portion while the average-risk and high-risk split the remaining portion while half of the one-star value funds are average-risk and half are high-risk with no low-risk.

2.66 cont. (c) Pivotal table of the average 3-year return for each type, risk and rating.

Average of 3YrReturn%	Star Rating					
Type	Five	Four	One	Three	Two	Grand Total
Growth	**22.6507**	**24.3170**	**19.4017**	**22.5215**	**19.2314**	**22.4376**
Average	23.4607	26.4473	15.4300	21.3446	18.8055	22.7413
High	25.3019	26.2200	23.3733	31.4318	26.6150	26.7529
Low	18.7739	21.1783		17.1546	15.0900	18.5432
Value	**19.8206**	**19.8369**	**23.5700**	**22.3324**	**20.5120**	**20.4245**
Average	19.0800	19.0000	14.9300	20.7650	15.9650	18.8719
High	25.7718	33.5100	32.2100	25.8000	26.4000	26.7200
Low	17.2510	17.6975		16.2200	17.8300	17.3435
Grand Total	**21.8084**	**22.7587**	**20.4438**	**22.4720**	**19.6445**	**21.8362**

(d) There are 11 growth funds with high risk with a rating of three and the summary statistics of their 3-year return are given below:

3YrReturn%	
Mean	31.43182
Standard Error	3.40912
Median	27.33
Mode	#N/A
Standard Deviation	11.30677
Sample Variance	127.8431
Kurtosis	7.037849
Skewness	2.472372
Range	41.68
Minimum	21.23
Maximum	62.91
Sum	345.75
Count	11

The average 3-year return is 31.4318% with a standard deviation of 11.3068%. The median is lower than the mean at 27.33%. The lowest return is 21.23% while the highest is 62.91% which yields a range of 41.68%.

2.67 (a) Presented below are just one of the $4 \cdot 3 \cdot 2 \cdot 1 = 24$ possible pivotal tables of tallies in terms of counts:

Count of 3YrReturn%	Risk																
	Average					Average Total	High					High Total	Low				Low Total	Grand Total
Type	Five	Four	One	Three	Two		Five	Four	One	Three	Two		Five	Four	Three	Two		
Growth	**60**	**15**	**3**	**24**	**11**	**113**	**27**	**3**	**3**	**11**	**4**	**48**	**31**	**12**	**13**	**6**	**62**	**223**
Large	24	5	3	13	2	47	4			2	2	8	23	9	10	6	48	103
Mid-Cap	23	6		8	7	44	8			2		10	6	3	3		12	66
Small	13	4		3	2	22	15	3	3	7	2	30	2				2	54
Value	**19**	**2**	**1**	**6**	**4**	**32**	**11**	**2**	**1**	**8**	**4**	**26**	**20**	**12**	**3**	**2**	**37**	**95**
Large	14	1	1	5	4	25							17	9	3	1	30	55
Mid-Cap	3	1		1		5	5	1		2	1	9	2	2		1	5	19
Small	2					2	6	1	1	6	3	17	1	1			2	21
Grand Total	**79**	**17**	**4**	**30**	**15**	**145**	**38**	**5**	**4**	**19**	**8**	**74**	**51**	**24**	**16**	**8**	**99**	**318**

Presented below are just one of the $4 \cdot 3 \cdot 2 \cdot 1 = 24$ possible pivotal tables of tallies in terms of % of grand total:

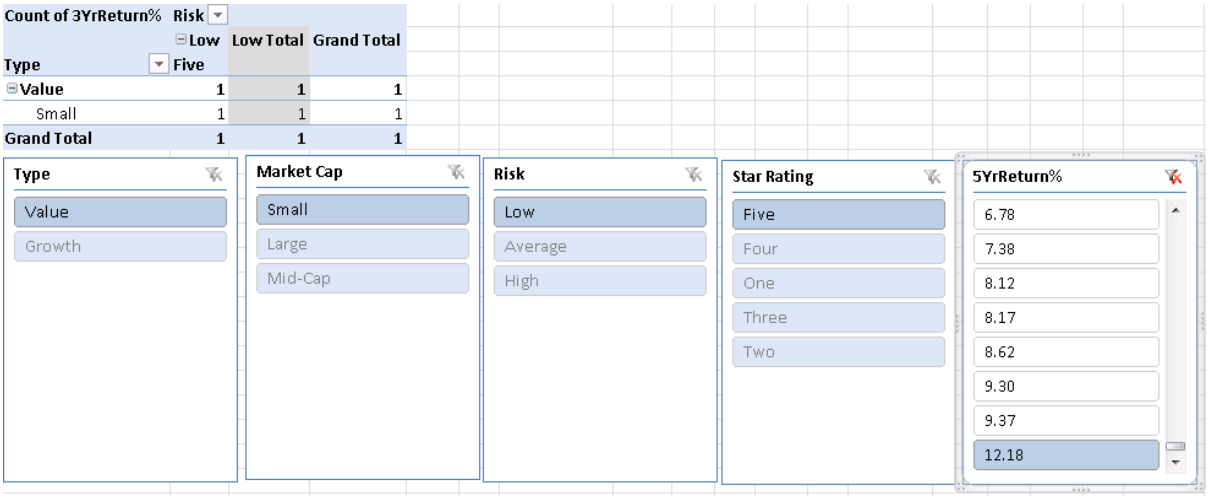
Count of 3YrReturn%	Risk																
	Average					Average Total	High					High Total	Low				Low Total	Grand Total
Type	Five	Four	One	Three	Two		Five	Four	One	Three	Two		Five	Four	Three	Two		
Growth	**18.87%**	**4.72%**	**0.94%**	**7.55%**	**3.46%**	**35.53%**	**8.49%**	**0.94%**	**0.94%**	**3.46%**	**1.26%**	**15.09%**	**9.75%**	**3.77%**	**4.09%**	**1.89%**	**19.50%**	**70.13%**
Large	7.55%	1.57%	0.94%	4.09%	0.63%	14.78%	1.26%	0.00%	0.00%	0.63%	0.63%	2.52%	7.23%	2.83%	3.14%	1.89%	15.09%	32.39%
Mid-Cap	7.23%	1.89%	0.00%	2.52%	2.20%	13.84%	2.52%	0.00%	0.00%	0.63%	0.00%	3.14%	1.89%	0.94%	0.94%	0.00%	3.77%	20.75%
Small	4.09%	1.26%	0.00%	0.94%	0.63%	6.92%	4.72%	0.94%	0.94%	2.20%	0.63%	9.43%	0.63%	0.00%	0.00%	0.00%	0.63%	16.98%
Value	**5.97%**	**0.63%**	**0.31%**	**1.89%**	**1.26%**	**10.06%**	**3.46%**	**0.63%**	**0.31%**	**2.52%**	**1.26%**	**8.18%**	**6.29%**	**3.77%**	**0.94%**	**0.63%**	**11.64%**	**29.87%**
Large	4.40%	0.31%	0.31%	1.57%	1.26%	7.86%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	5.35%	2.83%	0.94%	0.31%	9.43%	17.30%
Mid-Cap	0.94%	0.31%	0.00%	0.31%	0.00%	1.57%	1.57%	0.31%	0.00%	0.63%	0.31%	2.83%	0.63%	0.63%	0.00%	0.31%	1.57%	5.97%
Small	0.63%	0.00%	0.00%	0.00%	0.00%	0.63%	1.89%	0.31%	0.31%	1.89%	0.94%	5.35%	0.31%	0.31%	0.00%	0.00%	0.63%	6.60%
Grand Total	**24.84%**	**5.35%**	**1.26%**	**9.43%**	**4.72%**	**45.60%**	**11.95%**	**1.57%**	**1.26%**	**5.97%**	**2.52%**	**23.27%**	**16.04%**	**7.55%**	**5.03%**	**2.52%**	**31.13%**	**100.00%**

(b) Patterns of risk conditioned on market cap and star rating:
From Problem 2.63 (b), we know that for the growth funds as a group, most are rated as average-risk, followed by low-risk and then high-risk. The pattern of risk rating is the same only among mid-cap growth funds. The pattern is different among the small-cap growth funds with most rated as high-risk, followed by average-risk and then low-risk. Among the large-cap growth funds, most are rated as low-risk, followed by average risk, and finally high-risk. If we want to bore further down into the subsets of star-rating among the large-cap growth funds, we see that only the subset of four-star large-cap growth funds has the same pattern as the subset of large-cap growth funds regardless of star-rating with most rated as low-risk, followed by average-risk and then high-risk.
Patterns of market cap conditioned on risk and star-rating:
Again, from Problem 2.63 (b), we know that most of the growth funds are large-cap, followed by mid-cap and then small-cap. The pattern is similar among average-risk and low-risk growth funds but among the high-risk growth funds, most are small-cap followed by mid-cap and then large-cap. If we bore further down into the subsets of star-rating among the average-risk growth funds, we see that only the subsets of five-star and three-star average-risk growth funds have the same pattern as the subset of average-risk growth funds regardless of star-rating with the largest portion of large-cap, followed by mid-cap and then small-cap.

(c) The table in this problem encompasses all the information in the tables in Problems 2.63 – 2.66. Unless you are interested in boring down further into the additional attributes of the funds, the tables in Problems 2.63-2.66 are easier to interpret than the one in this problem.

(d) The table in this problem provides more detailed information regarding the additional variable not included in the tables in Problems 2.63 – 2.66. Unless the purpose is to learn more about the patterns in regard to the additional conditioning variable, there will be no difference in what you observe in Problems 2.63 – 2.66 and what you can observe in this problem.

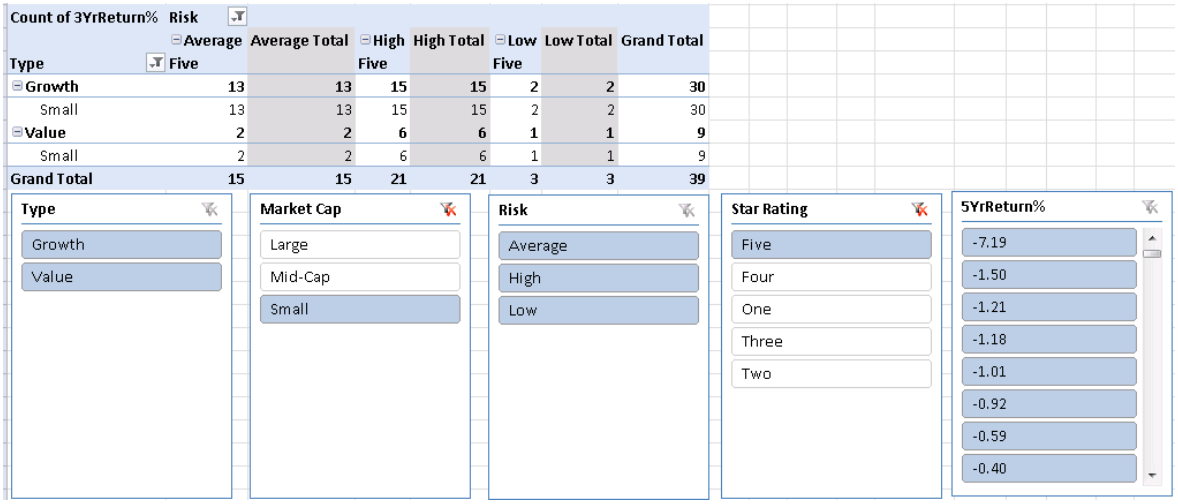
2.68 Excel screenshot:



Count of 3YrReturn%	Risk		
	Low	Low Total	Grand Total
Type	Five		
Value	1	1	1
Small	1	1	1
Grand Total	1	1	1

The fund with the highest five-year return is a small-cap low-risk five-star rated value fund.

2.69 Excel screenshot:

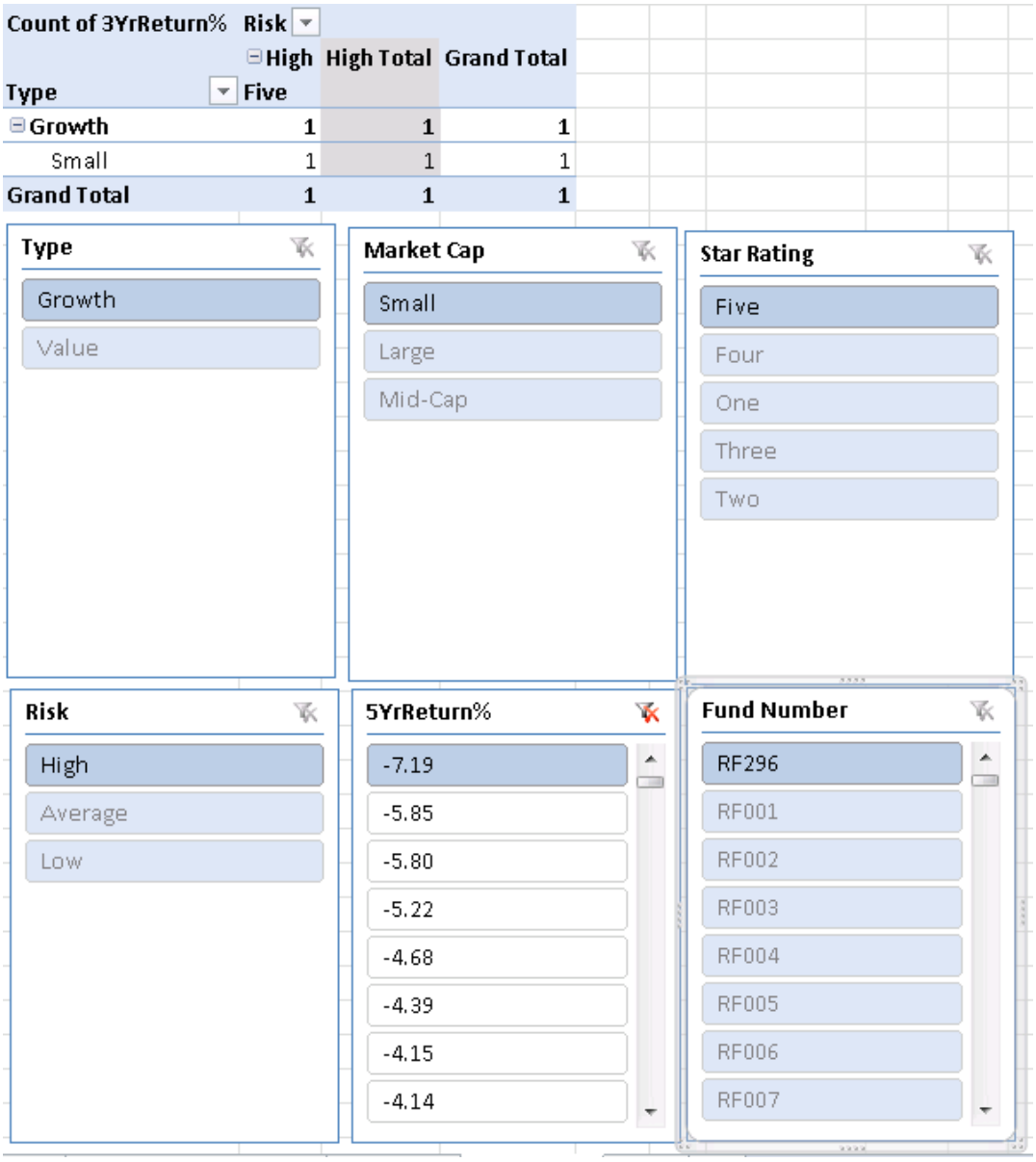


Count of 3YrReturn%	Risk						
	Average	Average Total	High	High Total	Low	Low Total	Grand Total
Type	Five		Five		Five		
Growth	13	13	15	15	2	2	30
Small	13	13	15	15	2	2	30
Value	2	2	6	6	1	1	9
Small	2	2	6	6	1	1	9
Grand Total	15	15	21	21	3	3	39

There are 39 small market cap funds that have a star rating of five stars and their summary statistics are shown below:

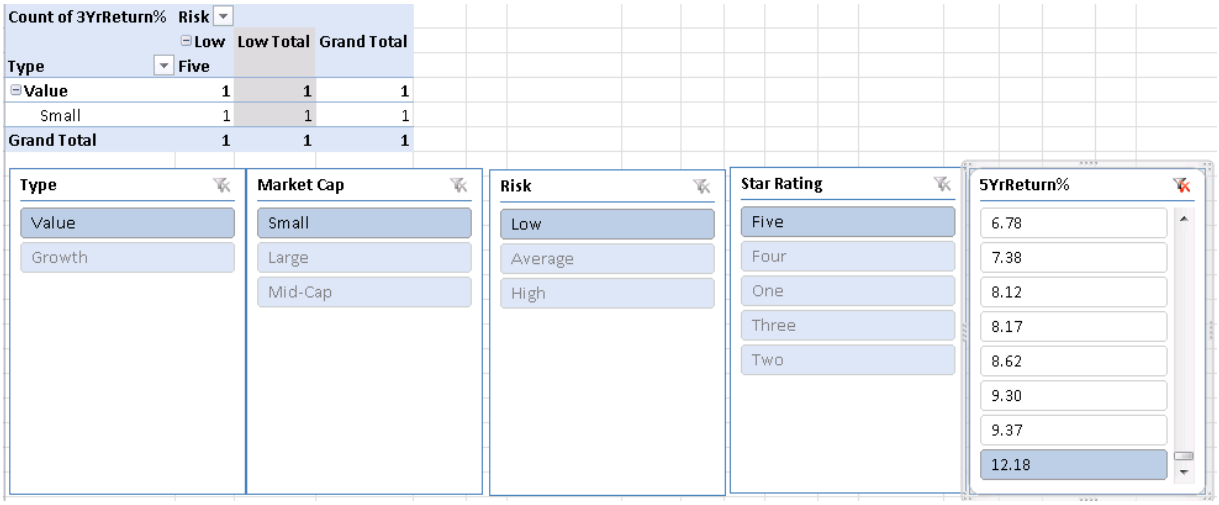
5YrReturn%	
Mean	2.46359
Standard Error	0.52586
Median	2.33
Mode	2.62
Standard Deviation	3.283997
Sample Variance	10.78463
Kurtosis	2.289764
Skewness	0.148329
Range	19.37
Minimum	-7.19
Maximum	12.18
Sum	96.08
Count	39

2.70 Excel screenshot:



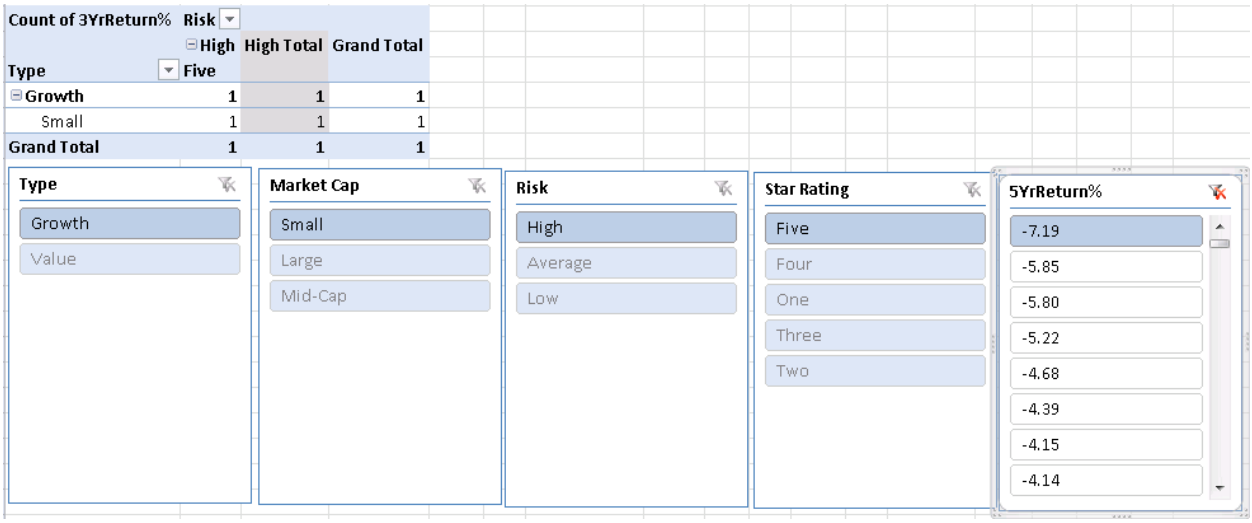
The fund number RF296 in the sample has the lowest five-year return.

2.71 Excel screenshot:



The five-star fund that has the highest five-year return is a small-cap low-risk value fund.

2.72 Excel screenshot:



The fund that has the lowest five-year return is a small-cap high-risk growth fund with a five-star rating.

2.73 A statistic is a summary measure describing a sample whereas a parameter is a summary measure describing an entire population.

2.74 A histogram uses bars to represent each class while a polygon uses a single point. The histogram should be used for only one group, while several polygons can be plotted on a single graph.

2.75 A summary table allows one to determine the frequency or percentage of occurrences in each category.

2.76 A bar chart is useful for comparing categories. A pie chart is useful when examining the portion of the whole that is in each category. A Pareto diagram is useful in focusing on the categories that make up most of the frequencies or percentages.

2.77 The bar chart for categorical data is plotted with the categories on the vertical axis and the frequencies or percentages on the horizontal axis. In addition, there is a separation between categories. The histogram is plotted with the class grouping on the horizontal axis and the frequencies or percentages on the vertical axis. This allows one to more easily determine the distribution of the data. In addition, there are no gaps between classes in the histogram.

2.78 A time-series plot is a type of scatter diagram with time on the x-axis.

2.79 Because the categories are arranged according to frequency or importance, it allows the user to focus attention on the categories that have the greatest frequency or importance.

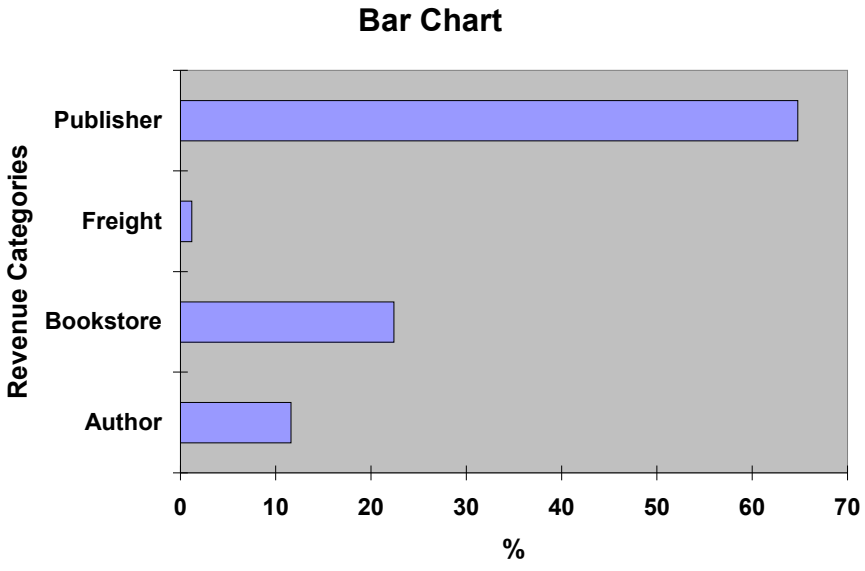
2.80 Percentage breakdowns according to the total percentage, the row percentage, and/or the column percentage allow the interpretation of data in a two-way contingency table from several different perspectives.

2.81 A contingency table contains information on two categorical variables whereas a multidimensional table can display information on more than two categorical variables.

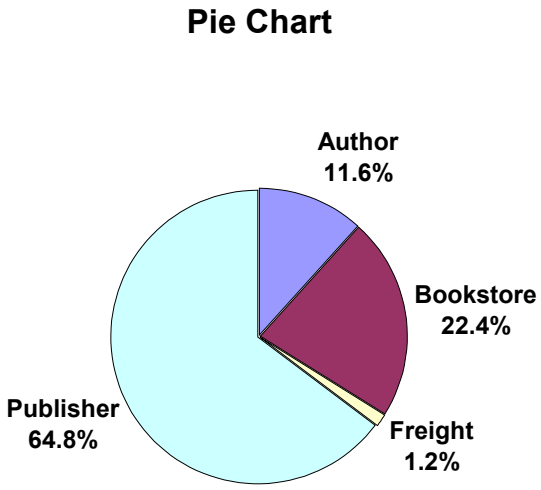
2.82 The multidimensional PivotTable can reveal additional patterns that cannot be seen in the contingency table. One can also change the statistic displayed and compute descriptive statistics which can add insight into the data.

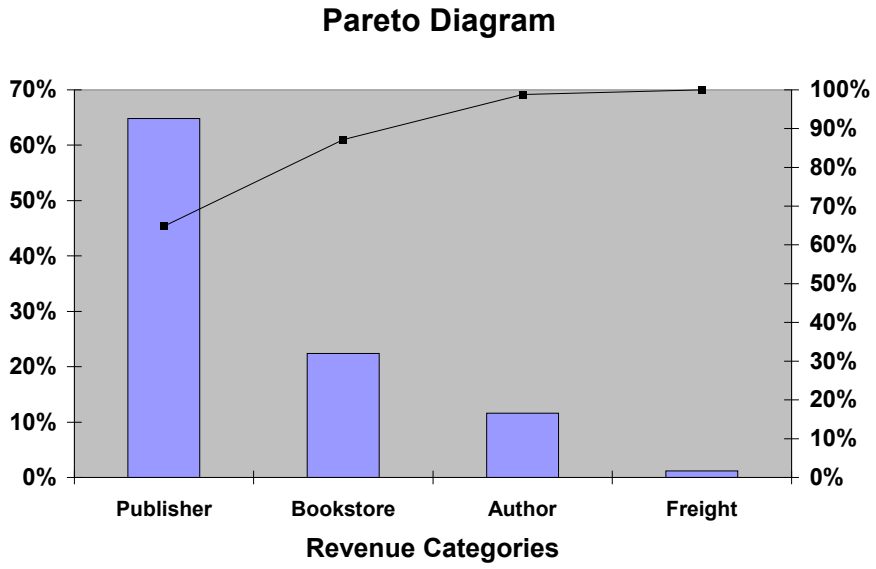
2.83 A drill-down in a PivotTable allows you to explore the characteristics of the subset of data which satisfy a specific combination of values of categorical variables while a slicer reverses the process and allows you to identify the combinations of categorical variables that produce the filtered data points. A slicer will also allow you to perform the functionality of a drill-down and, hence, it is more general and capable than a drill-down.

2.84 (a)

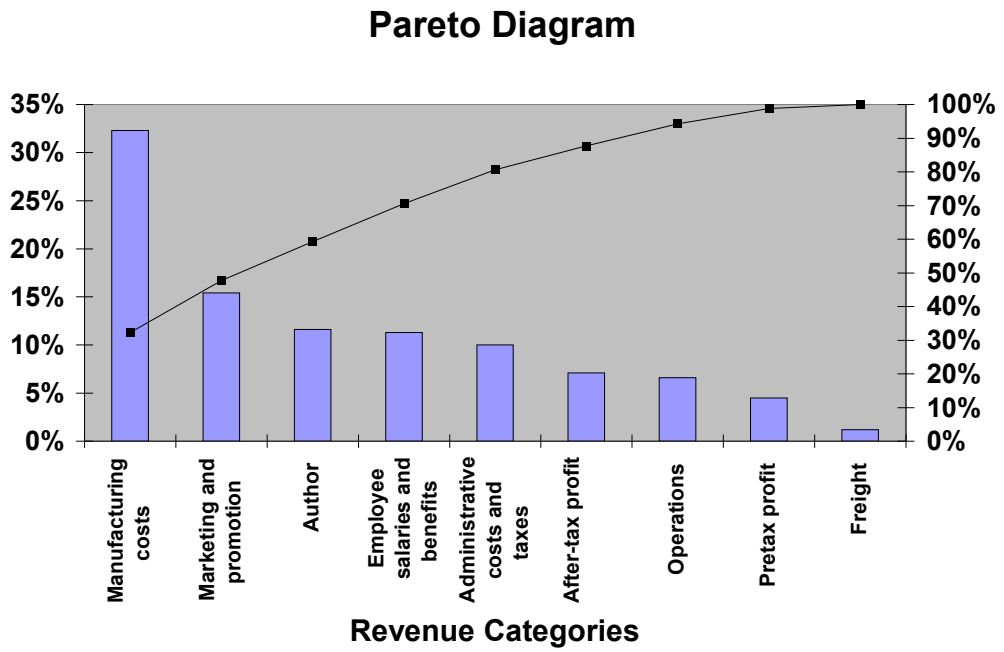


2.84 (a)
cont.



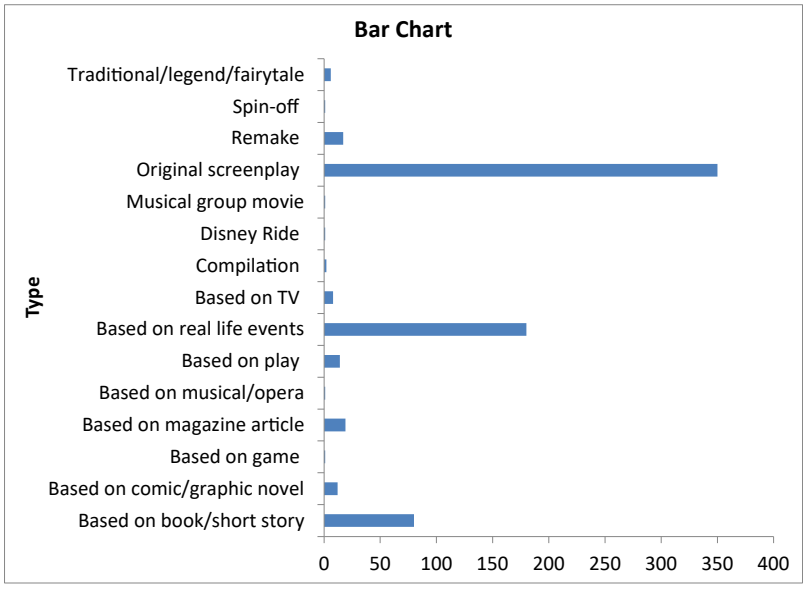


2.84 cont. (b)

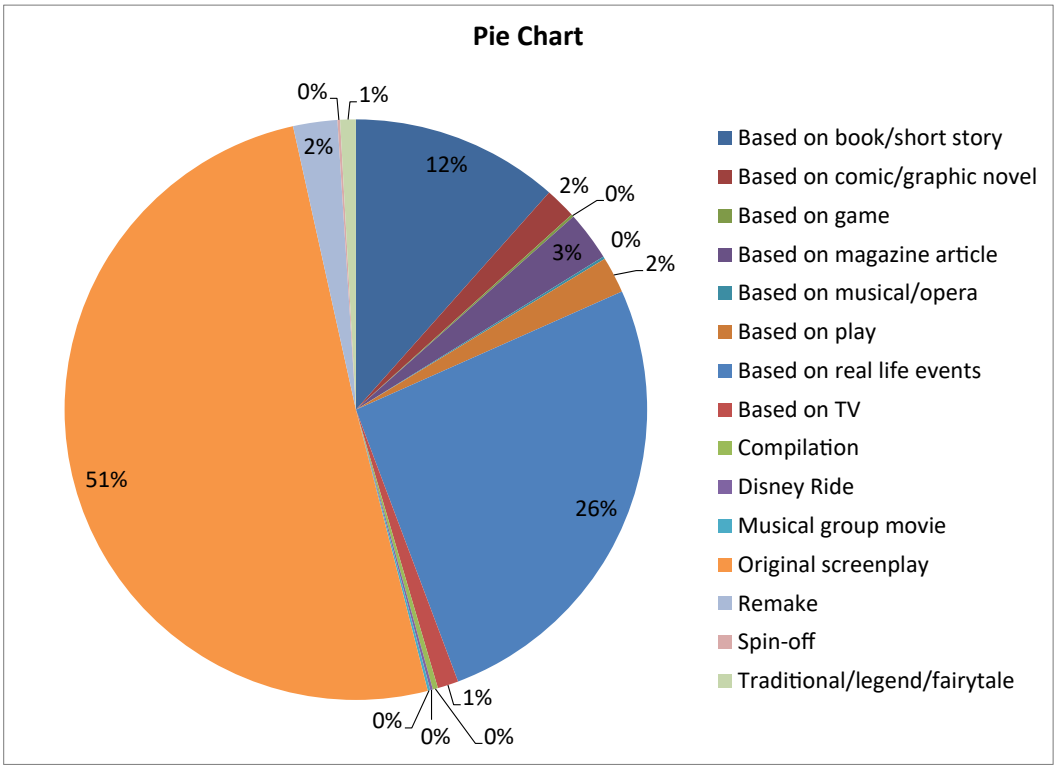


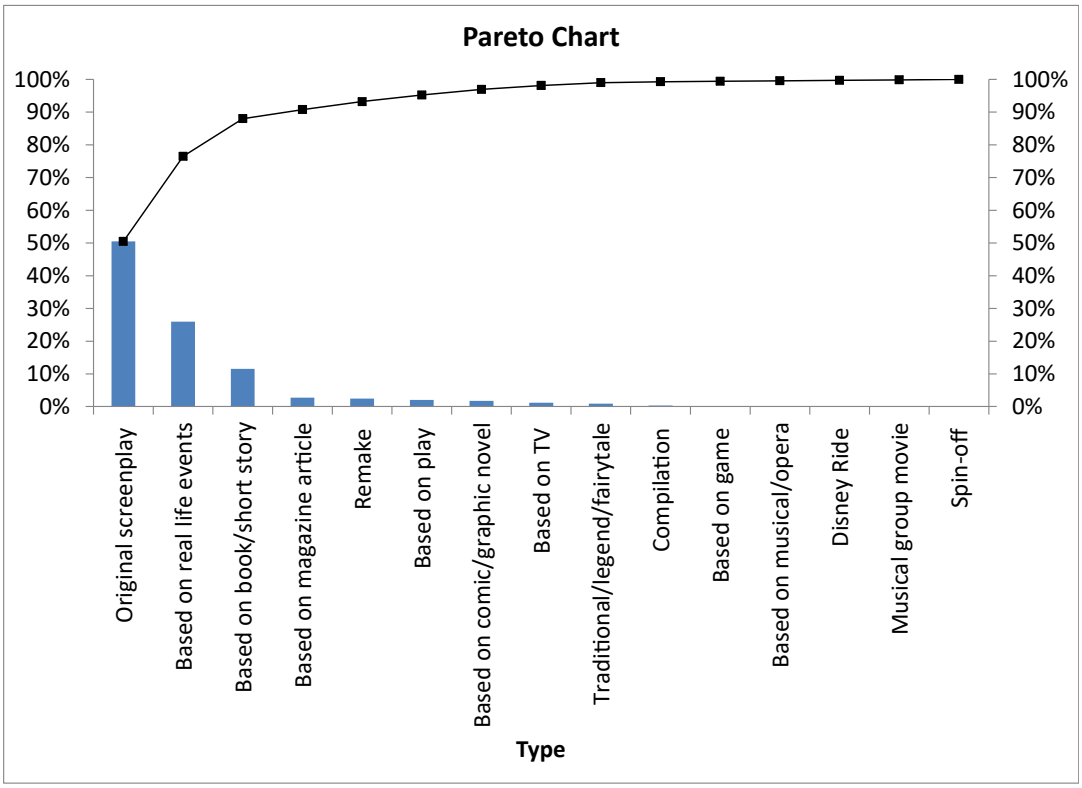
(c) The publisher gets the largest portion (64.8%) of the revenue. About half (32.3%) of the revenue received by the publisher covers manufacturing costs. The publisher's marketing and promotion account for the next largest share of the revenue, at 15.4%. Author, bookstore employee salaries and benefits, and publisher administrative costs and taxes each account for around 10% of the revenue, whereas the publisher after-tax profit, bookstore operations, bookstore pretax profit, and freight constitute the "trivial few" allocations of the revenue. Yes, the bookstore gets twice the revenue of the authors.

2.85 (a) **Number of Movies:**

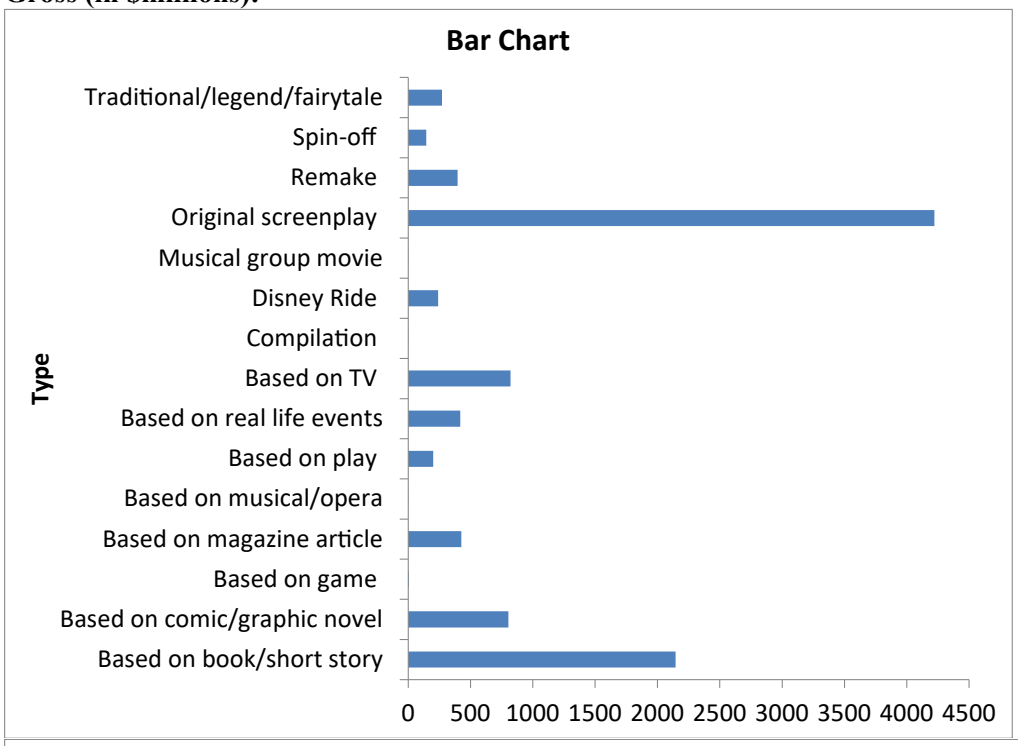


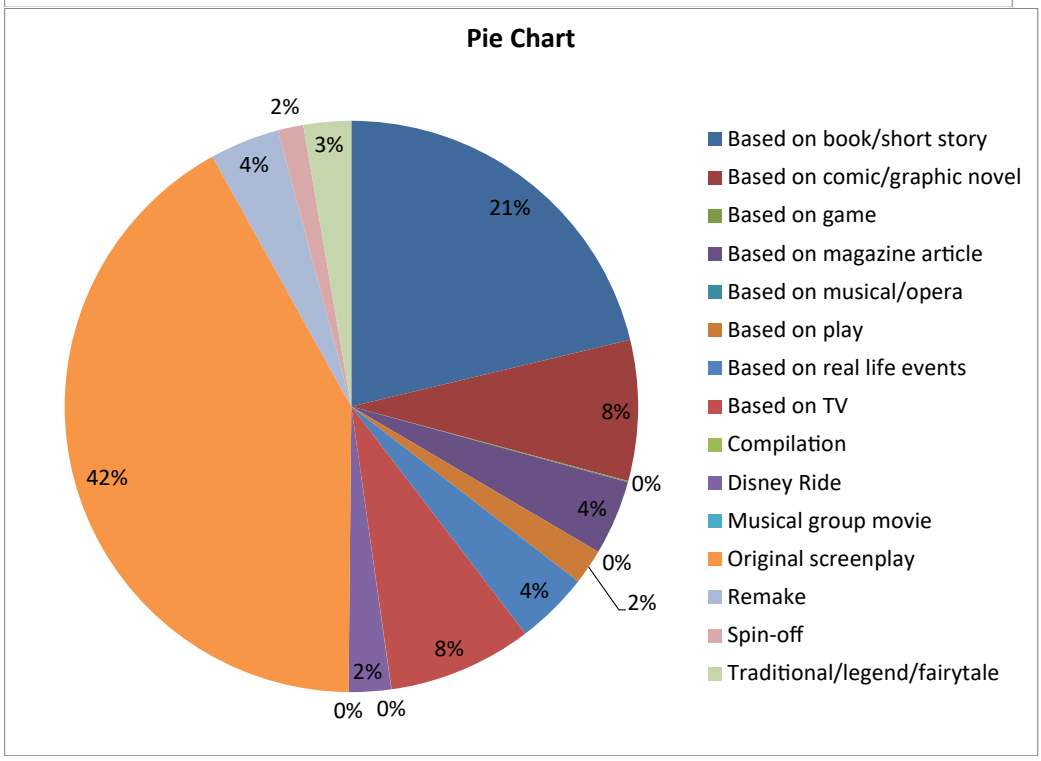
2.85 cont. (a)



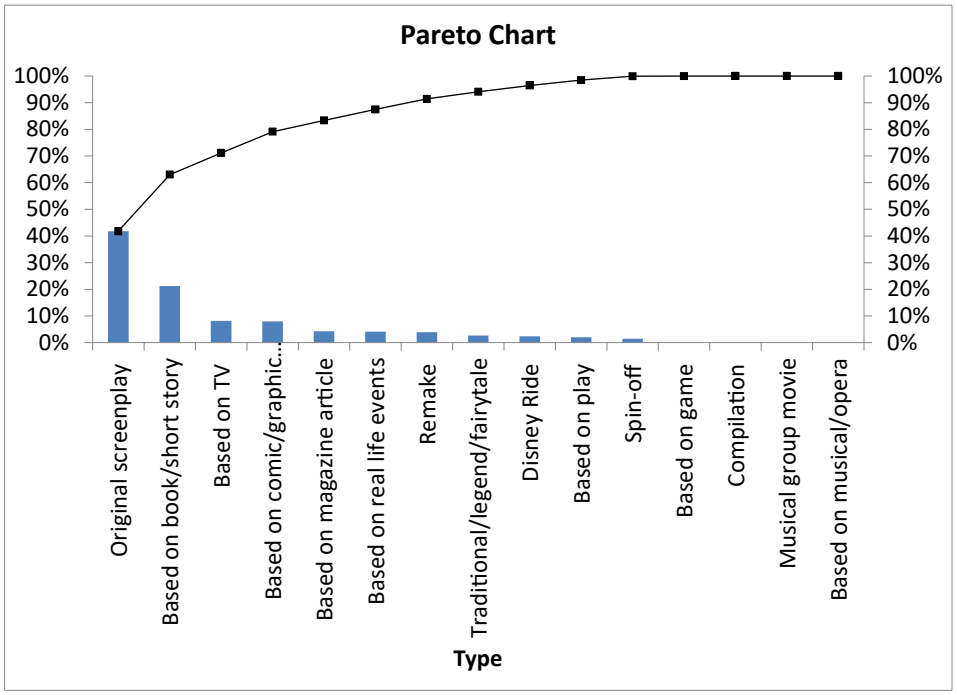


2.85 (a) **Gross (in $millions):**

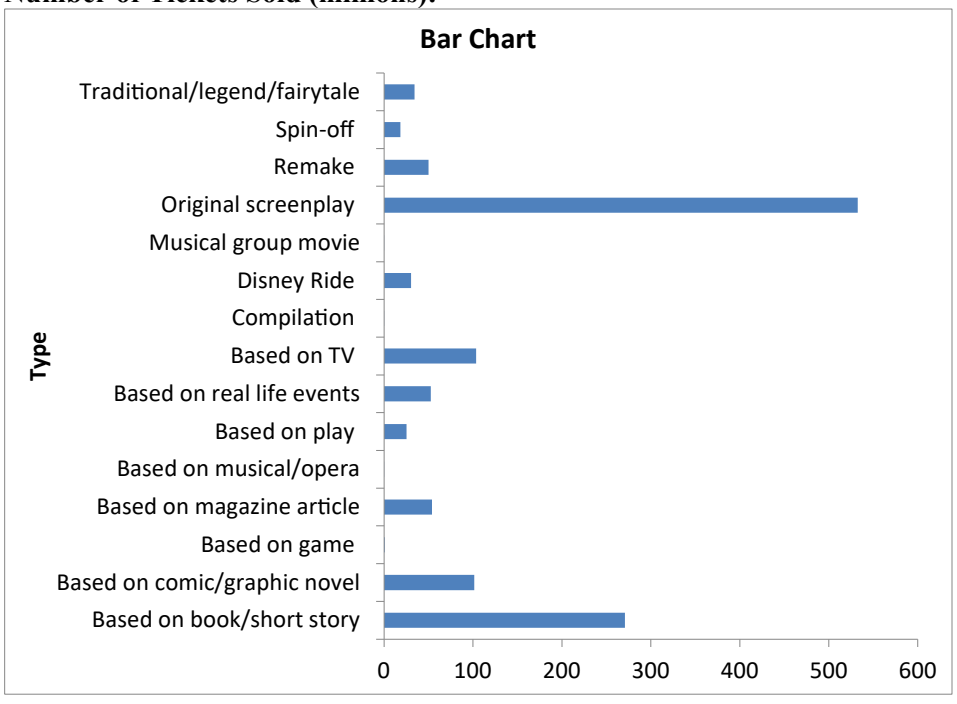




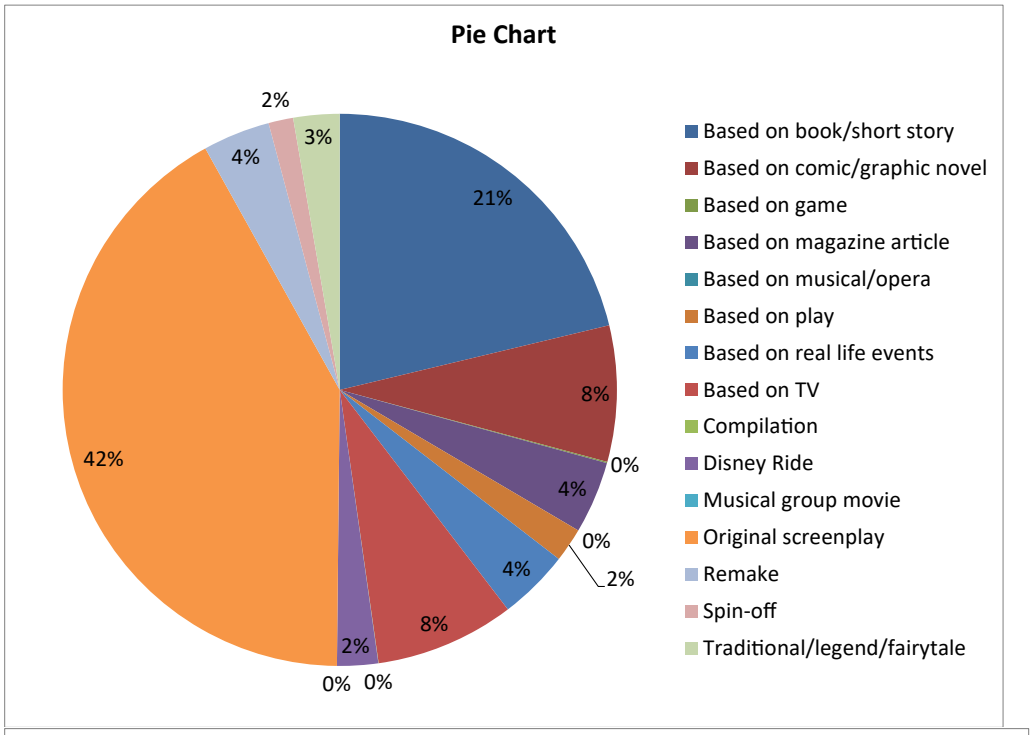
2.85 (a) cont.

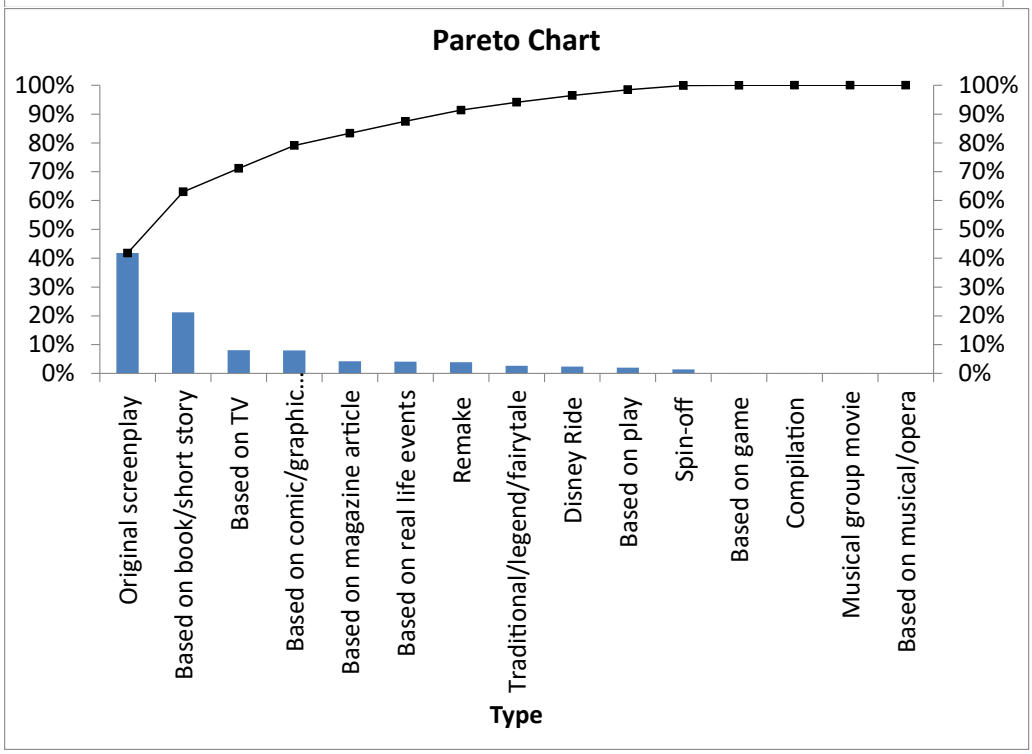


Number of Tickets Sold (millions):



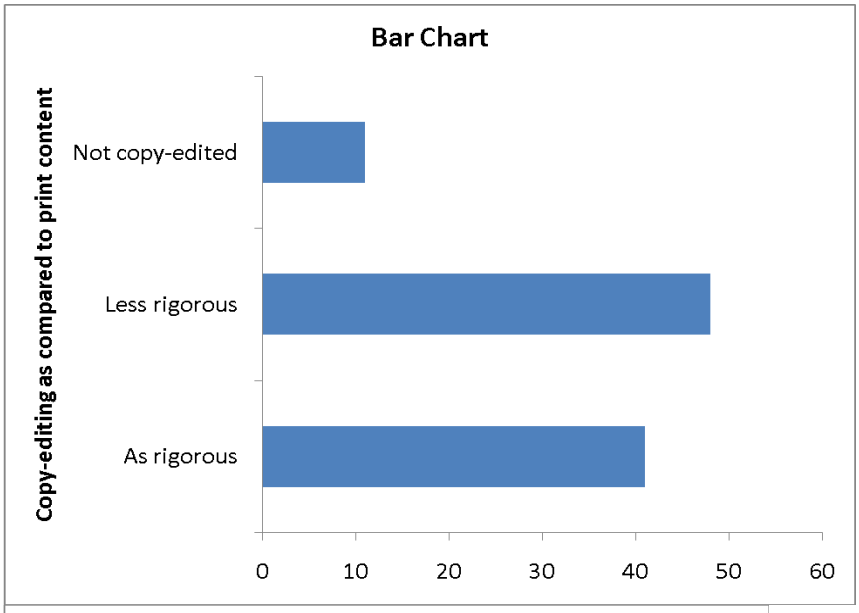
2.85 (a) cont.

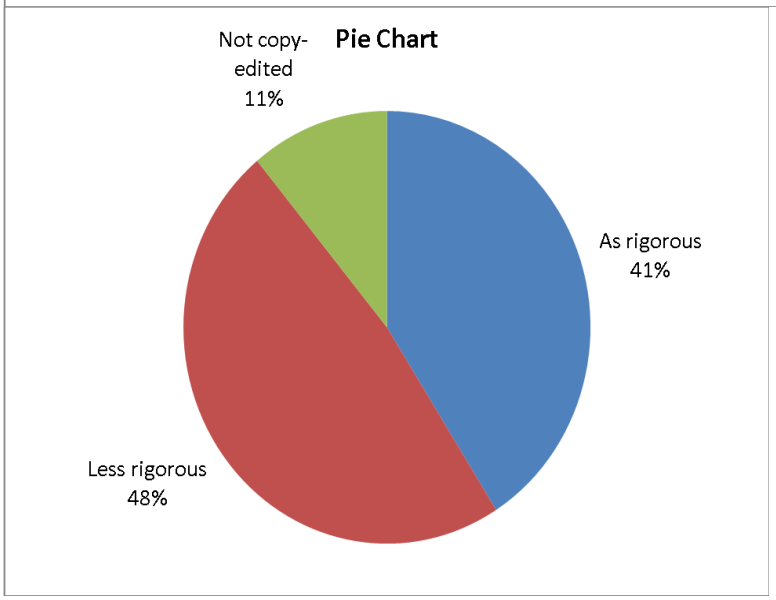




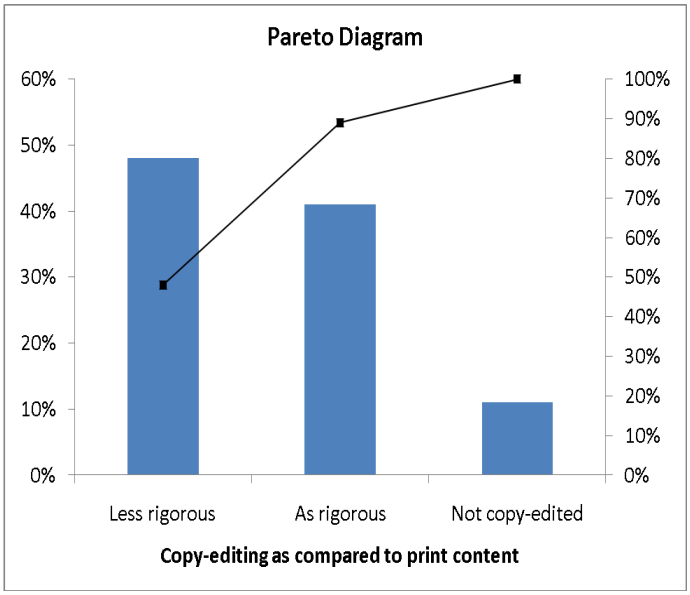
2.85 cont. (b) Based on the Pareto chart for the number of movies, "Original screenplay", "Based on real life events" and "Based on book/short story" are the "vital few" and capture nearly 90% of the market share. According to the Pareto chart for gross (in $millions) and number of ticket sold in millions, "Original screenplay", and "Based on book/short story" are the "vital few" and capture about 65% of the market share.

2.86 (a)



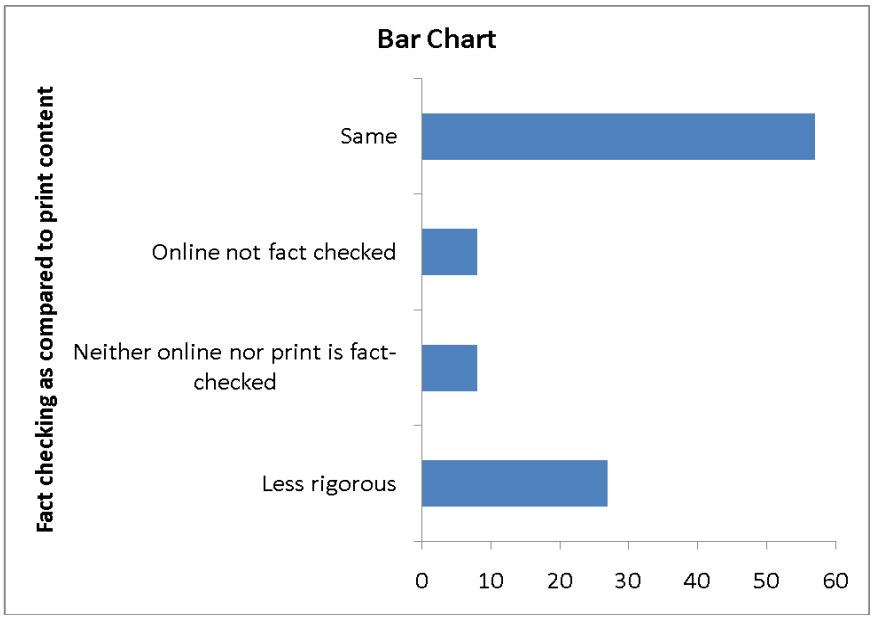


2.86 cont. (a)

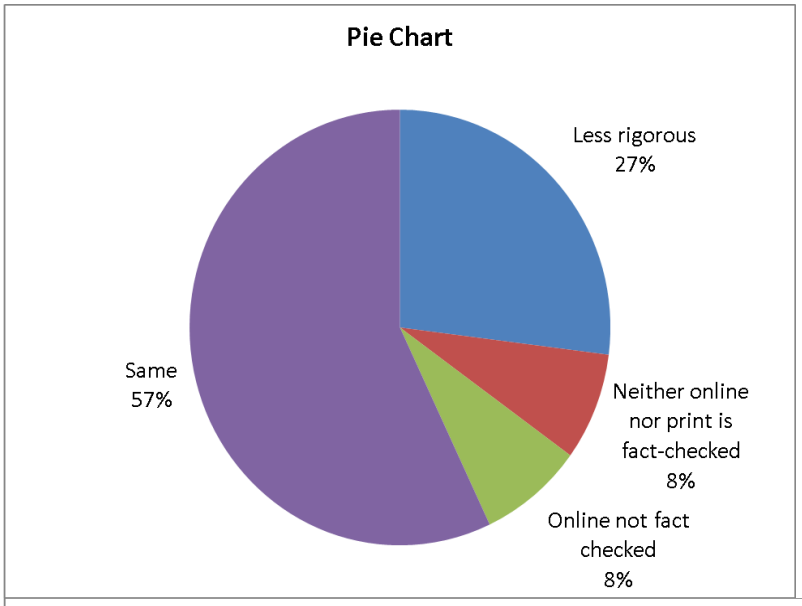


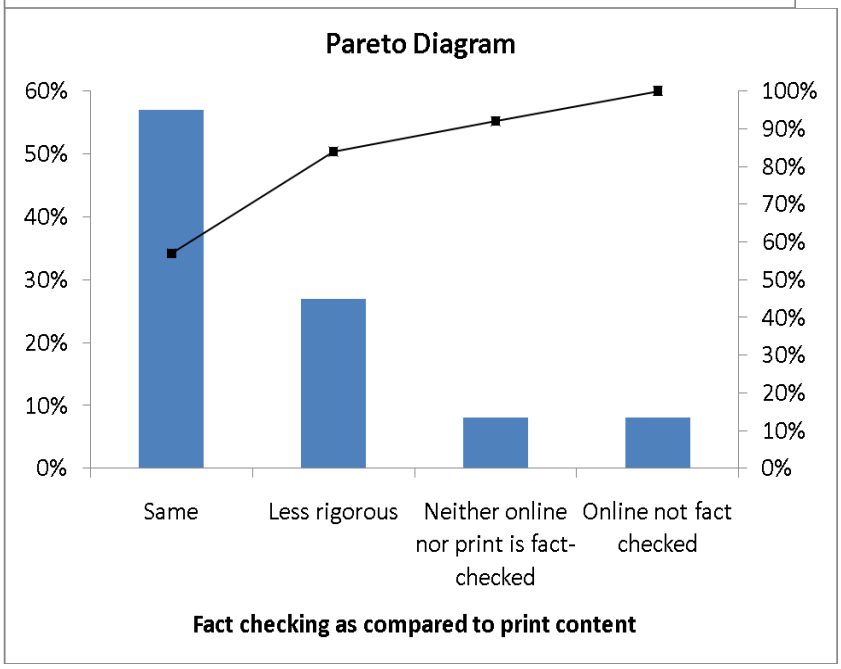
(b) Since there are only three categories, all the three graphical methods are capable of portraying these data well. The Pareto diagram, however, is better than the pie chart and bar chart because it not only sorts the frequencies in descending order, it also provides the cumulative polygon on the same scale.

(c)



2.86 (c) cont.





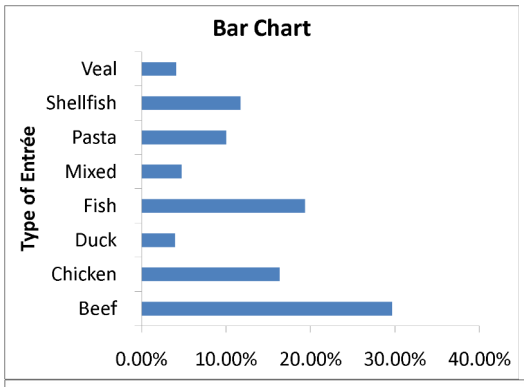
(d) Since there are only four categories, all the three graphical methods are capable of portraying these data well. The Pareto diagram, however, is better than the pie chart and bar chart because it not only sorts the frequencies in descending order, it also provides the cumulative polygon on the same scale.

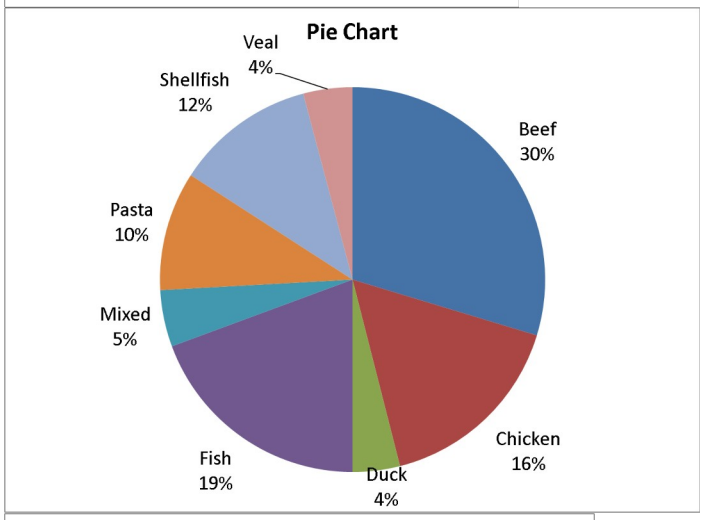
(e) Based on the Pareto chart for copy-editing, about 50% of the contents in online consumer magazines receive less rigorous copy-editing. Based on the Pareto chart for fact-checking, more than 50% of the contents in online consumer magazines receive the same amount of fact-checking.

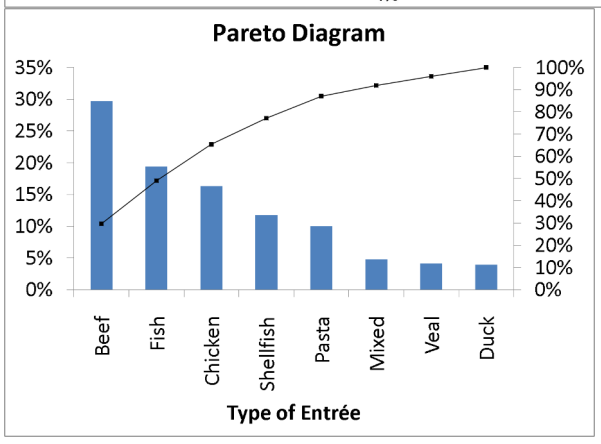
2.87 (a)

Type of Entrée	%	Number S
Beef	29.68%	187
Chicken	16.35%	103
Mixed	4.76%	30
Duck	3.97%	25
Fish	19.37%	122
Pasta	10.00%	63
Shellfish	11.75%	74
Veal	4.13%	26
Total	100.00%	630

(b)







2.87 cont. (c) The Pareto diagram has the advantage of offering the cumulative percentage view of the categories and, hence, enables the viewer to separate the "vital few" from the "trivial many".

(d) Beef and fish account for nearly 50% of all entrees ordered by weekend patrons of a continental restaurant. When chicken is included, nearly two-thirds of the entrees are accounted for.

2.88 (a)

Gender

Dessert Ordered	Male	Female	Total
Yes	71%	29%	100%
No	48%	52%	100%
Total	53%	47%	100%

Beef Entrée

Dessert Ordered	Yes	No	Total
Yes	52%	48%	100%
No	25%	75%	100%
Total	31%	69%	100%

Gender

Dessert Ordered	Male	Female	Total
Yes	30%	14%	23%
No	70%	86%	77%
Total	100%	100%	100%

Beef Entrée

Dessert Ordered	Yes	No	Total
Yes	38%	16%	23%
No	62%	84%	77%
Total	100%	100%	100%

Gender

Dessert Ordered	Male	Female	Total
Yes	16%	7%	23%
No	37%	40%	77%
Total	53%	47%	100%

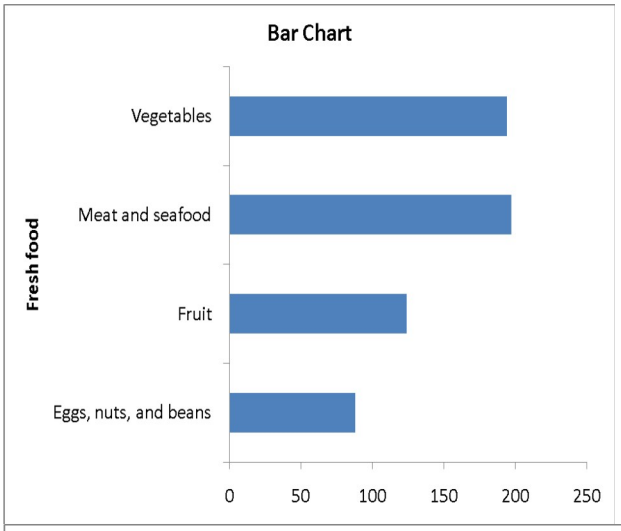
Beef Entrée

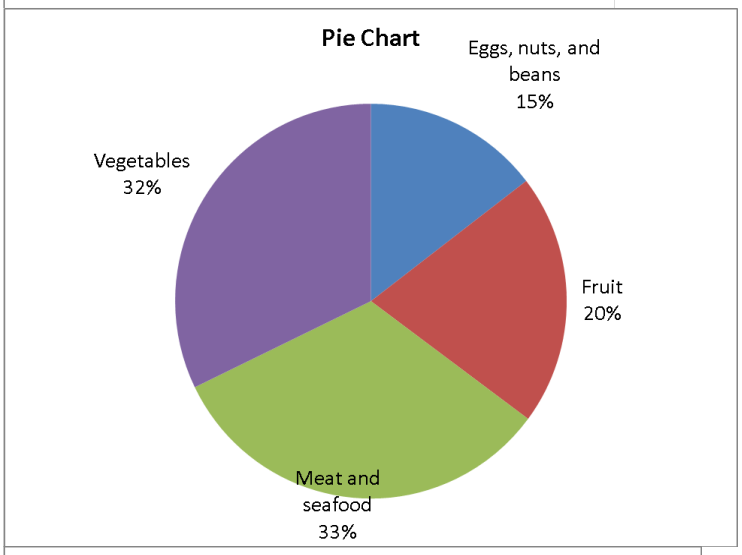
Dessert Ordered	Yes	No	Total
Yes	12%	11%	23%
No	19%	58%	77%
Total	31%	69%	100%

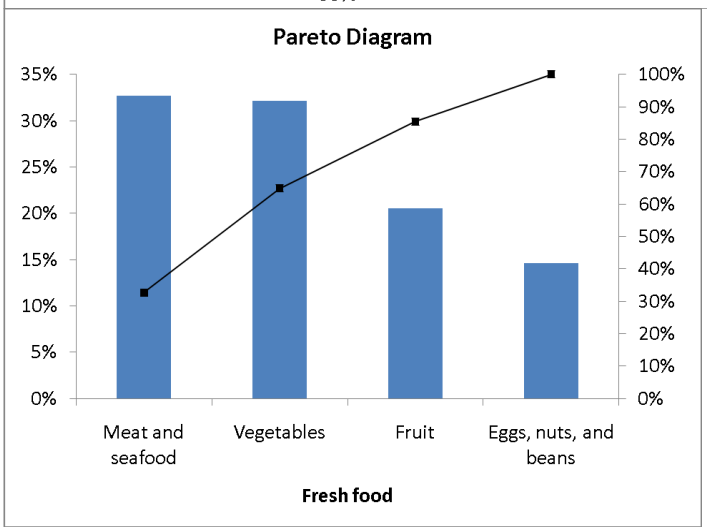
(b) If the owner is interested in finding out the percentage of joint occurrence of gender and ordering of dessert or the percentage of joint occurrence of ordering a beef entrée and a dessert among all patrons, the table of total percentages is most informative. If the owner is interested in the effect of gender on ordering of dessert or the effect of ordering a beef entrée on the ordering of dessert, the table of column percentages will be most informative. Since dessert will usually be ordered after the main entree and the owner has no direct control over the gender of patrons, the table of row percentages is not very useful here.

(c) 30% of the men sampled ordered desserts compared to 14% of the women. Men are more than twice as likely to order desserts as women. Almost 38% of the patrons ordering a beef entree ordered dessert compared to less than 16% of patrons ordering all other entrees. Patrons ordering beef are better than 2.3 times as likely to order dessert as patrons ordering any other entree.

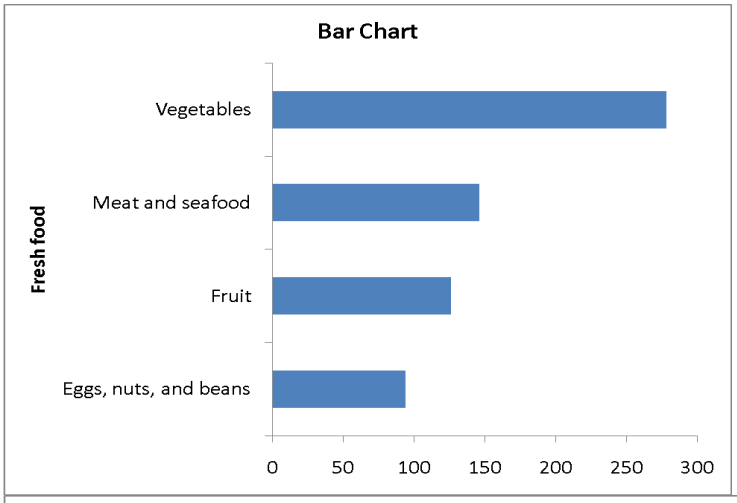
2.89 (a) **United States Fresh Food Consumed:**

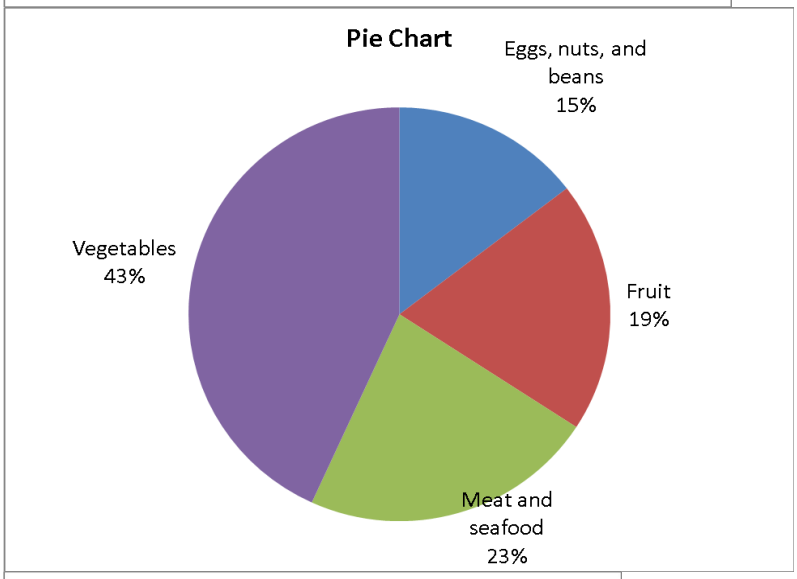


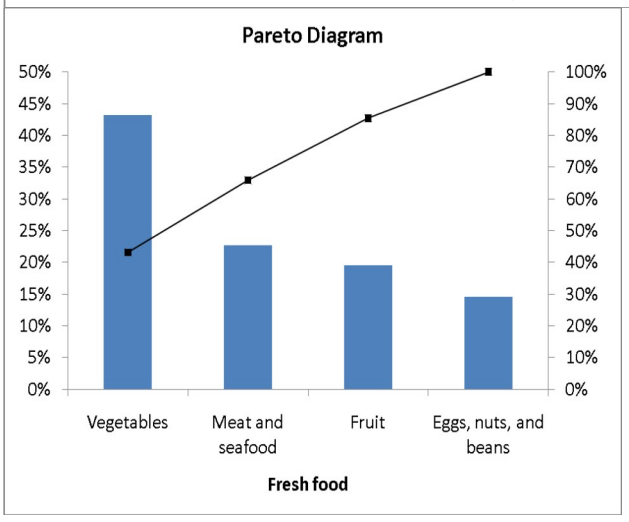




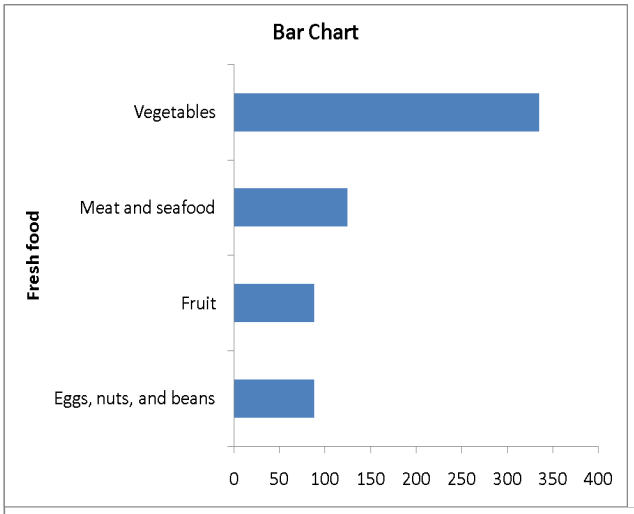
2.89 cont. (a) **Japan Fresh Food Consumed:**

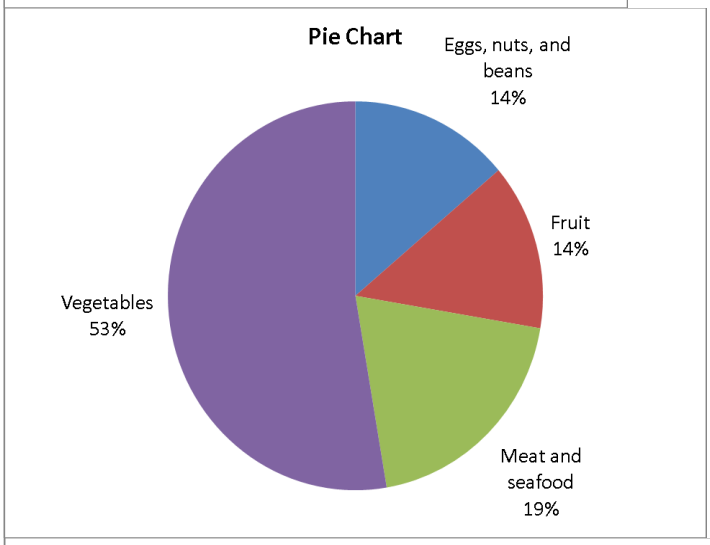


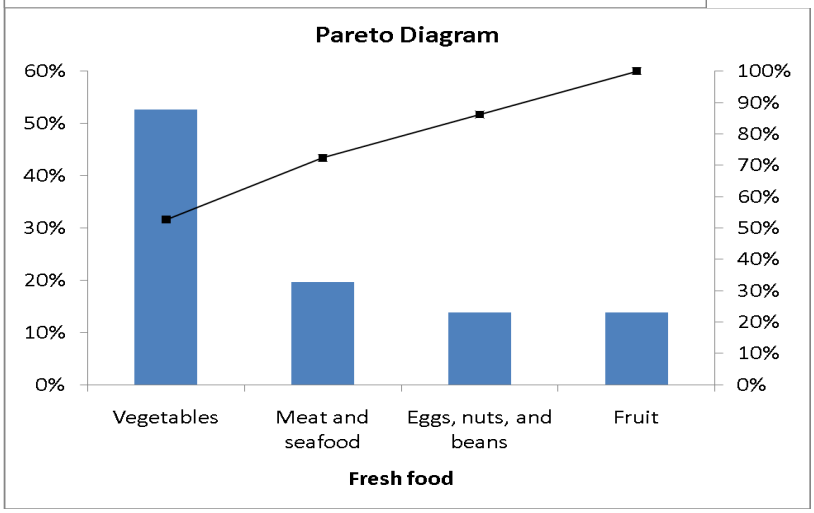




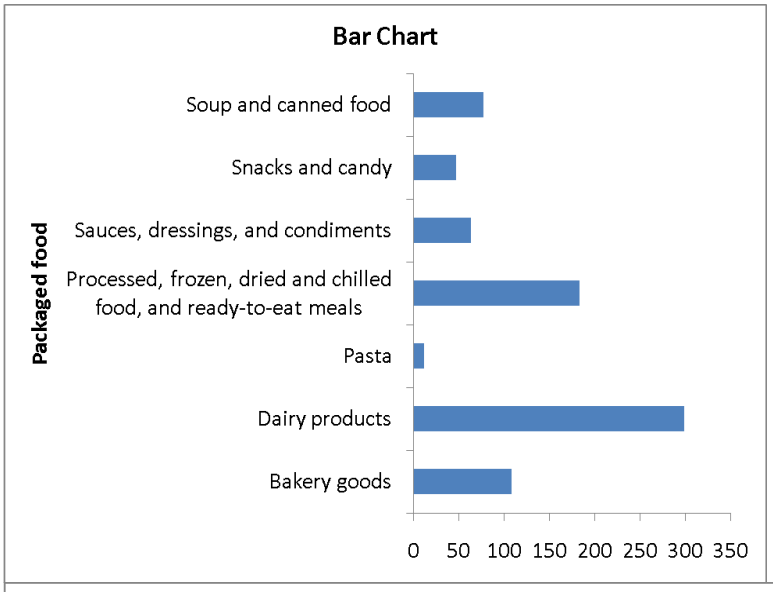
2.89 cont. (a) **Russia Fresh Food Consumed:**

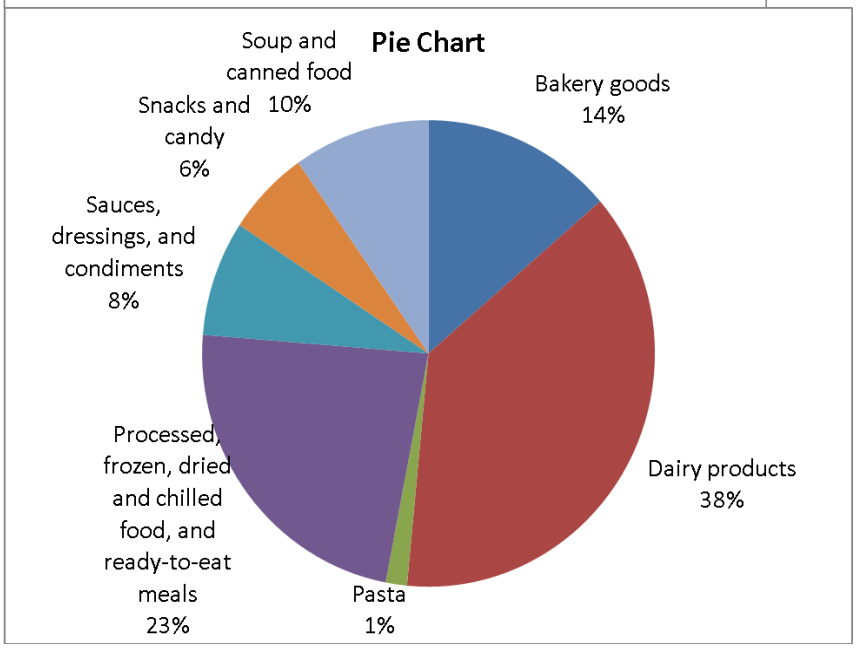




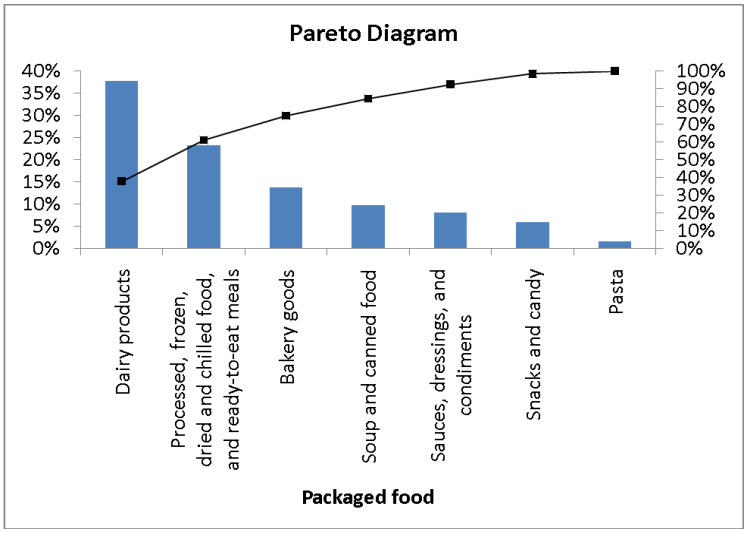


2.89 cont. (b) **United States Packaged Food Consumed:**

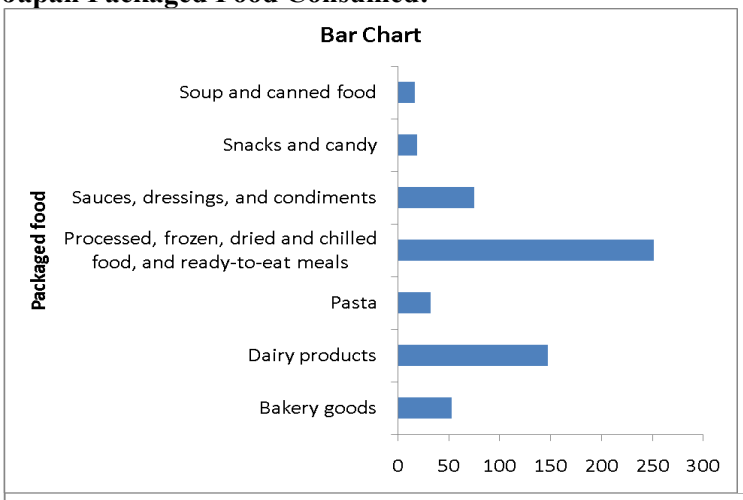


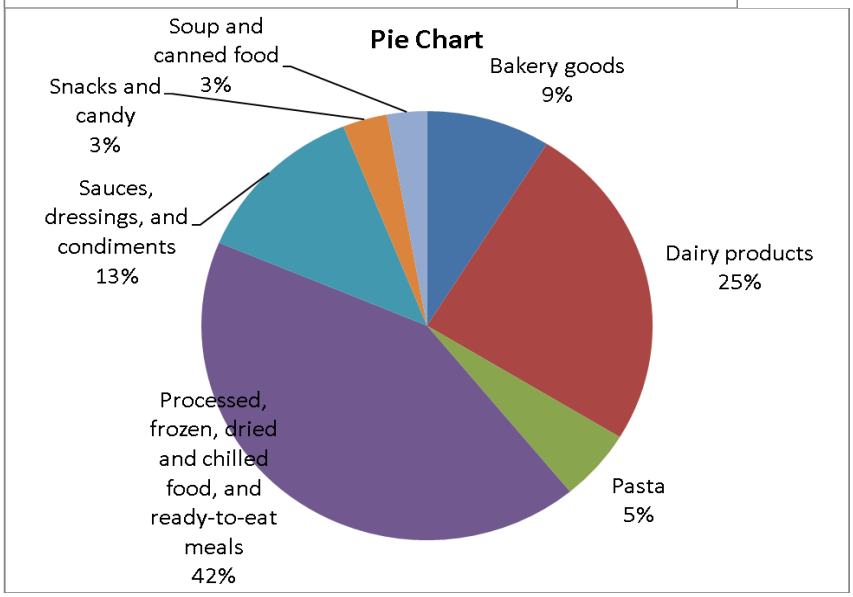


2.89 (b) cont.

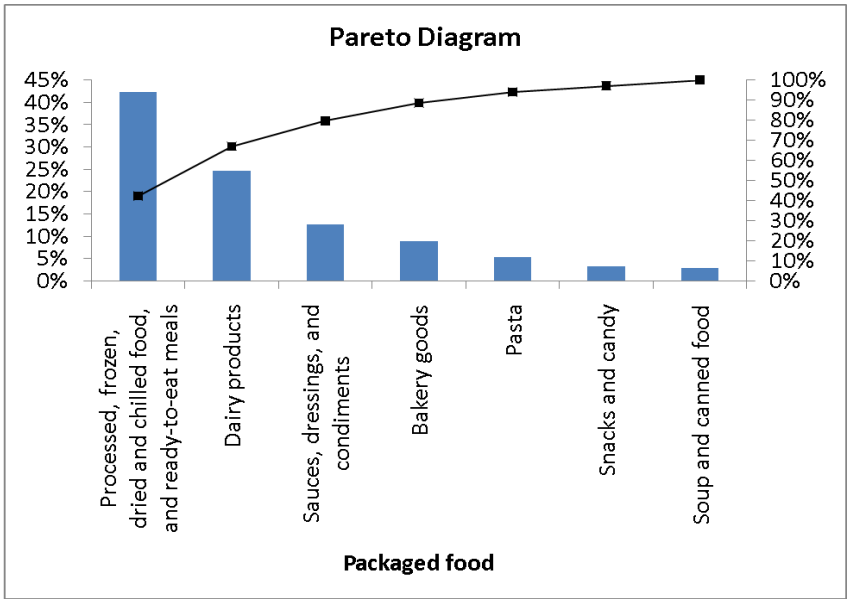


Japan Packaged Food Consumed:

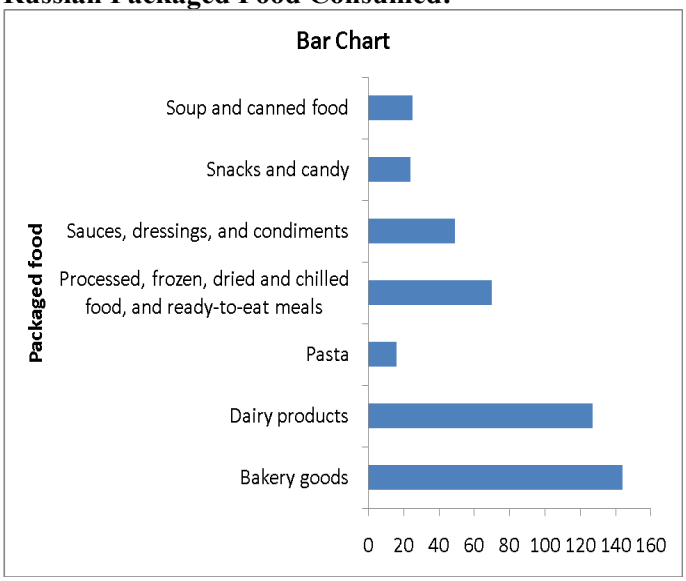




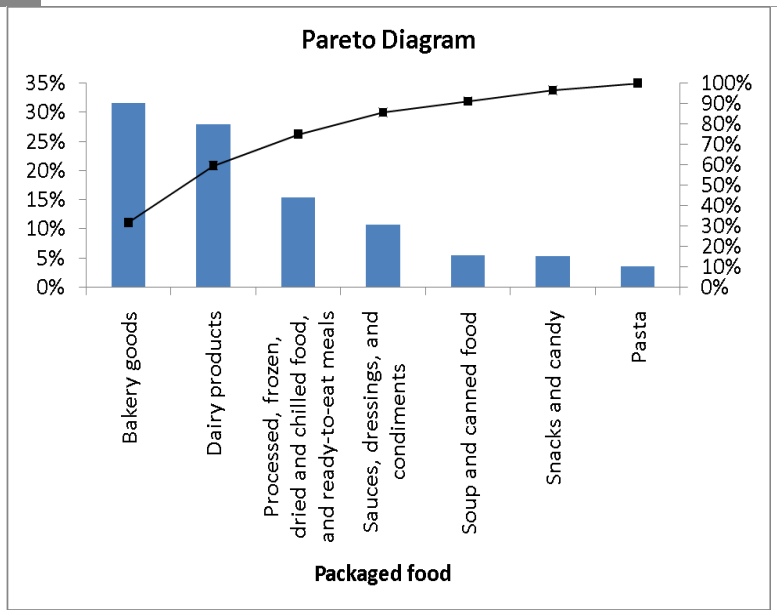
2.89 (b)
cont.



Russian Packaged Food Consumed:



2.89 cont. (b)

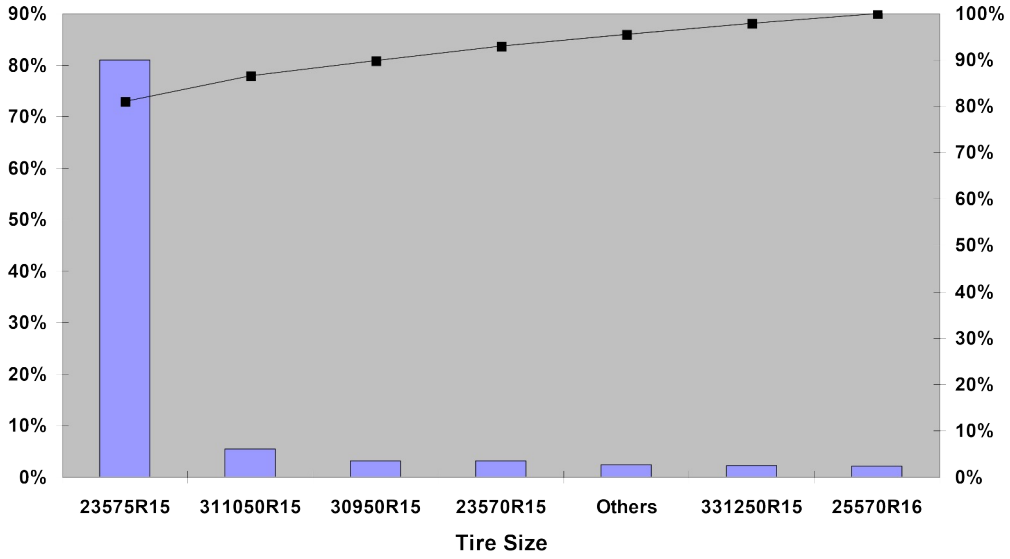


(c) The fresh food consumption patterns between Japanese and Russians are quite similar with vegetables taking up the largest share followed by meats and seafood while Americans consume about the same amount of meats and seafood, and vegetables. Among the three countries, vegetables, and meats and seafood constitute more than 60% of the fresh food consumption.

For Americans, dairy products, and processed, frozen, dried and chilled food and ready-to-eat meals make up slightly more than 60% of the packaged food consumption. For Japanese, processed, frozen, dried and chilled food, and ready-to-eat meals, and dairy products constitute more than 60% of their packaged food consumption. For the

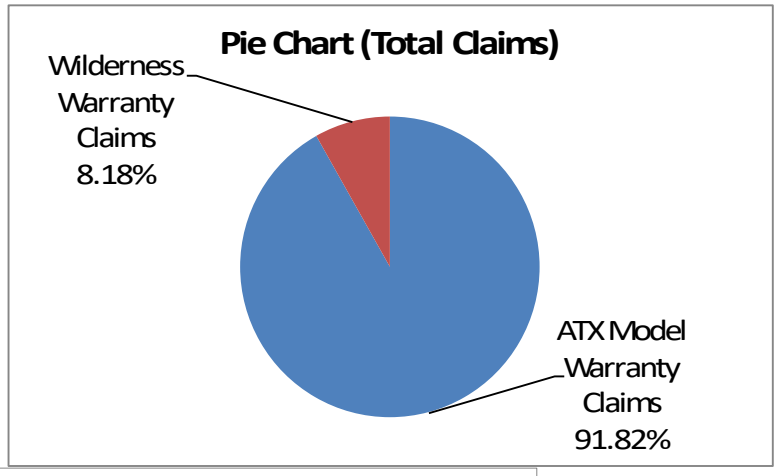
Russians, bakery goods and dairy products take up 60% of the share of their package food consumption.

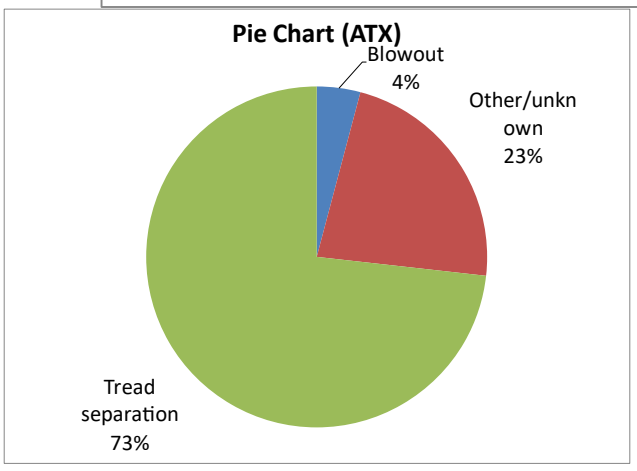
2.90 (a)



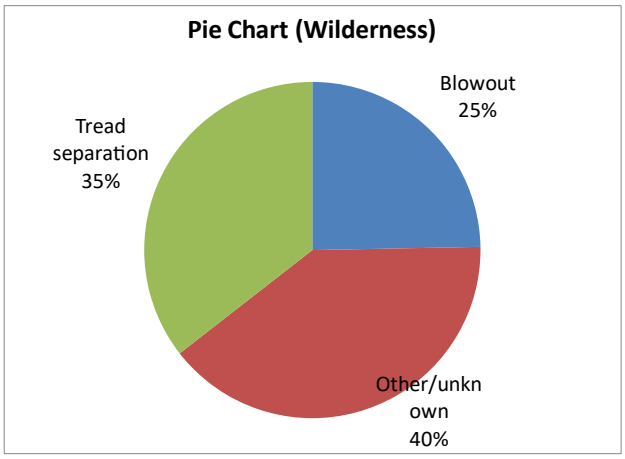
23575R15 accounts for over 80% of the warranty claims.

(b)



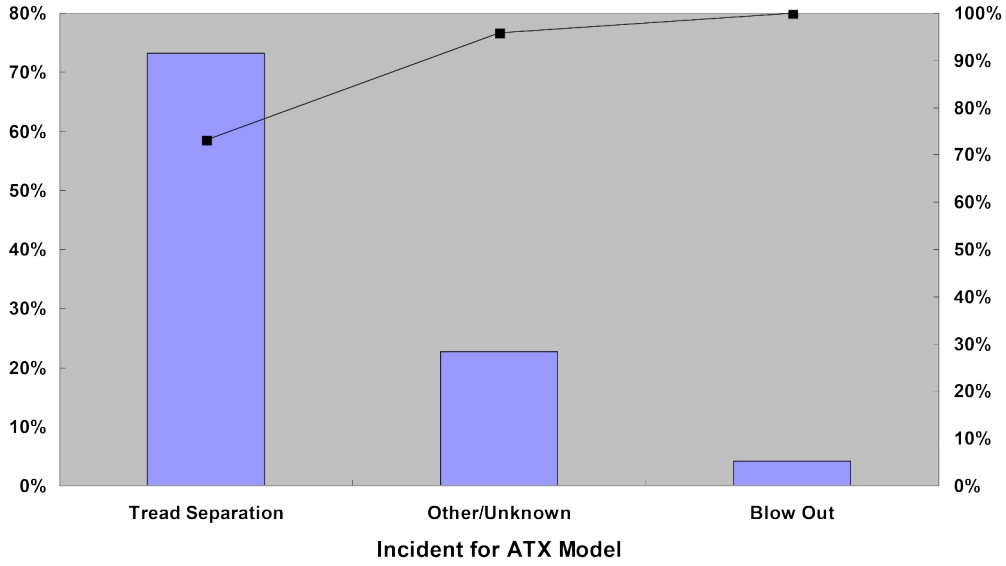


2.90 cont. (b)



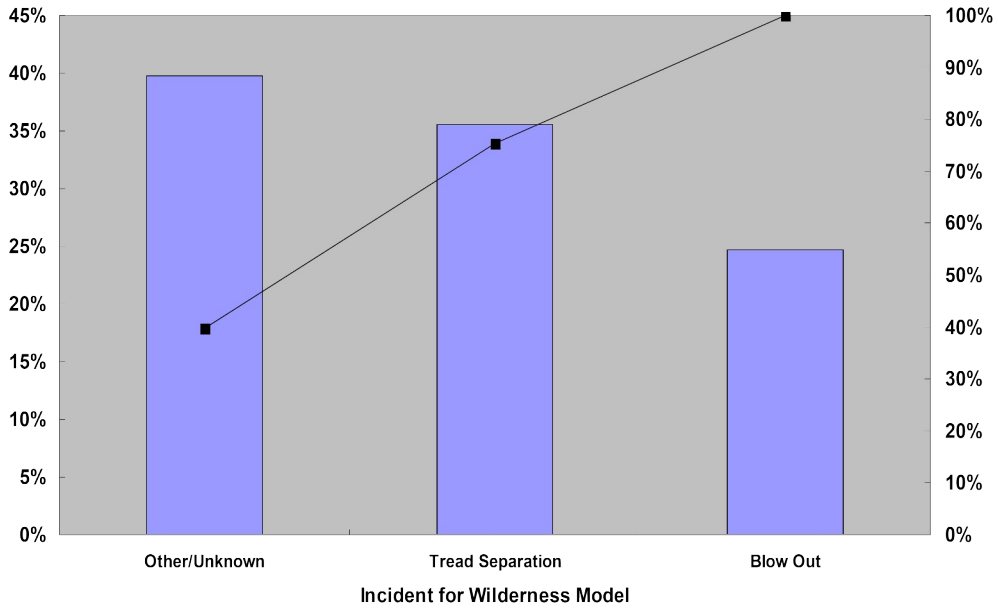
91.82% of the warranty claims are from the ATX model.

(c)



Tread separation accounts for 73.23% of the warranty claims among the ATX model..

2.90 (d)
cont.

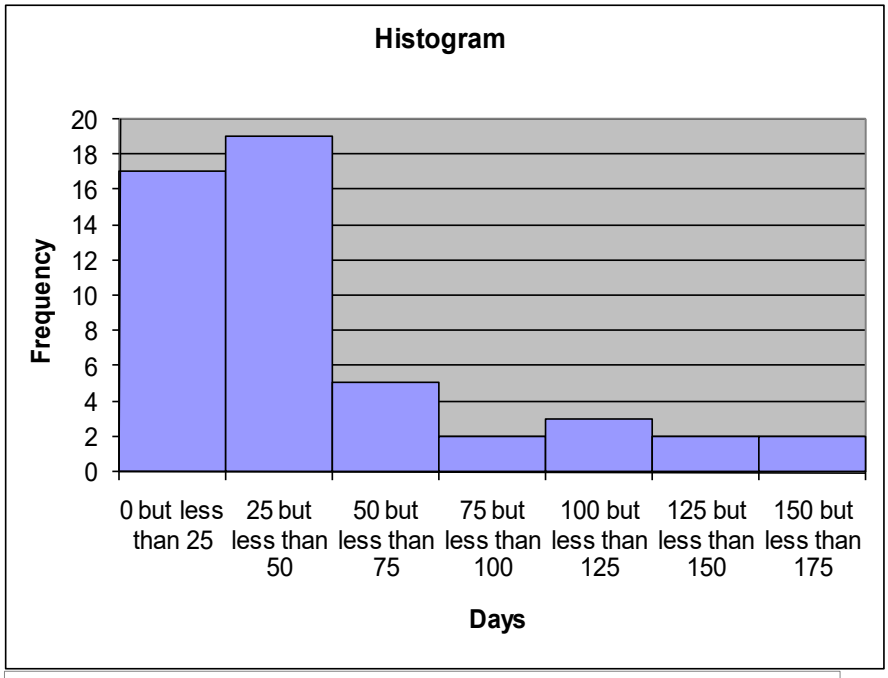


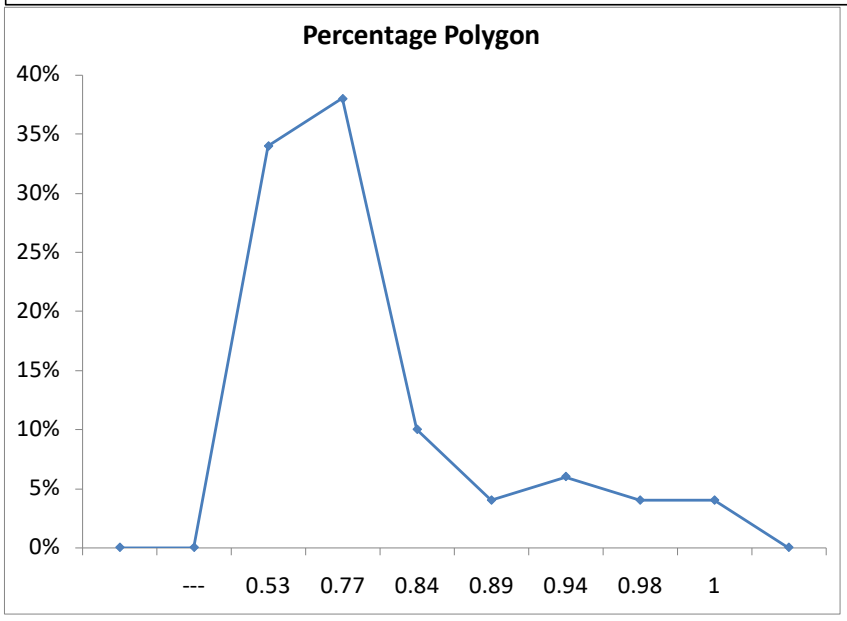
The number of claims is fairly evenly distributed among the three incidents; other/unknown incidents account for almost 40% of the claims, tread separation accounts for about 35% of the claims, and blowout accounts for about 25% of the claims.

2.91 (a)

Range	*Frequency*	*Percentage*
0 but less than 25	17	34%
25 but less than 50	19	38%
50 but less than 75	5	10%
75 but less than 100	2	4%
100 but less than 125	3	6%
125 but less than 150	2	4%
150 but less than 175	2	4%

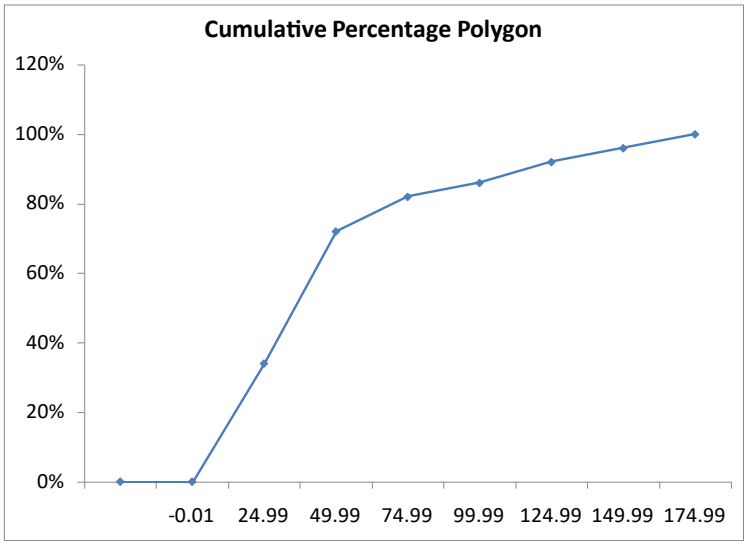
2.91 cont. (b)





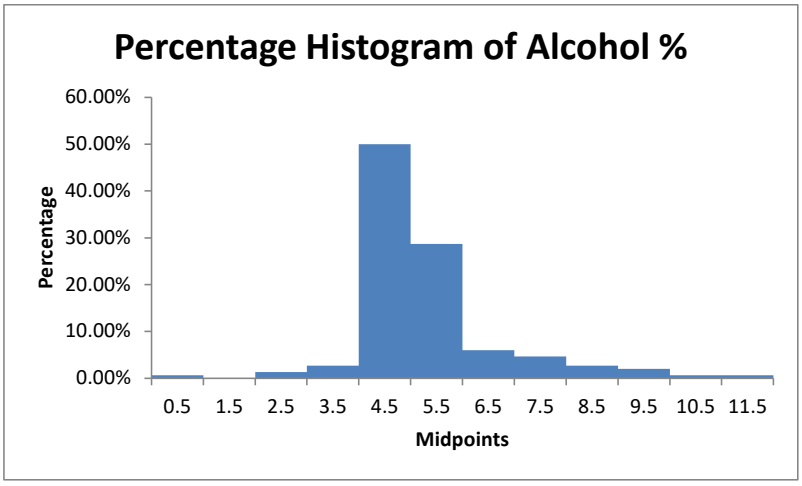
2.91 (c) cont.

Range	*Cumulative %*
0 but less than 25	34%
25 but less than 50	72%
50 but less than 75	82%
75 but less than 100	86%
100 but less than 125	92%
125 but less than 150	96%
150 but less than 175	100%

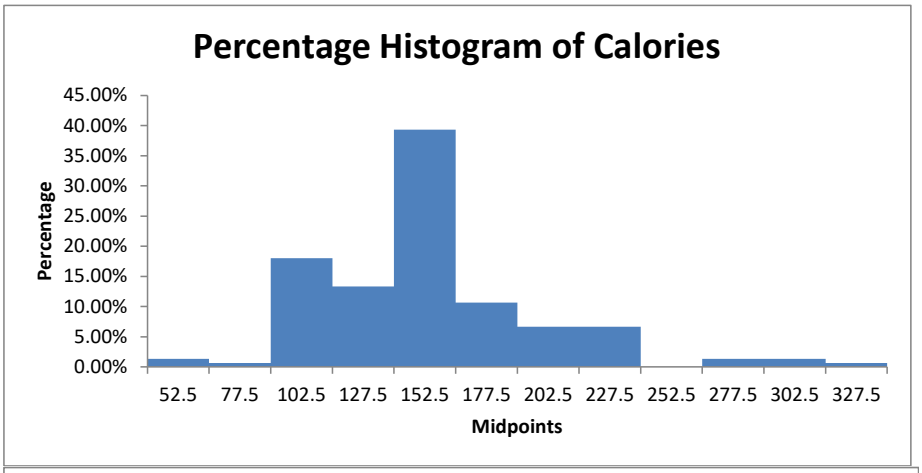


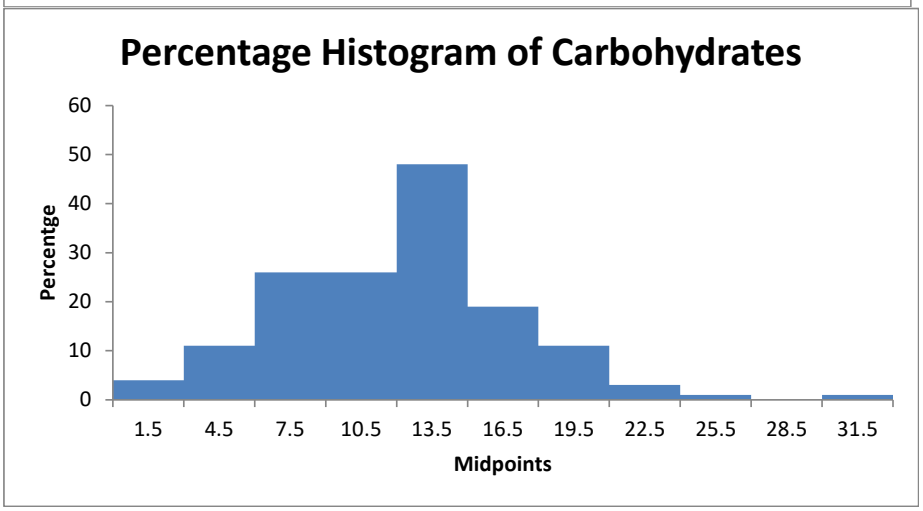
(d) You should tell the president of the company that over half of the complaints are resolved within a month, but point out that some complaints take as long as three or four months to settle.

2.92 (a)

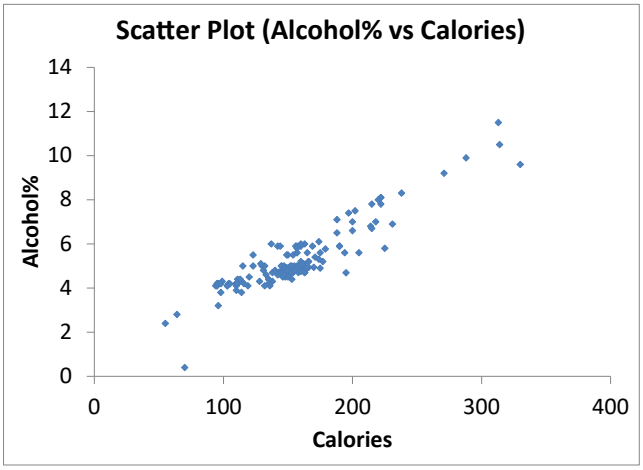


2.92 cont. (a)

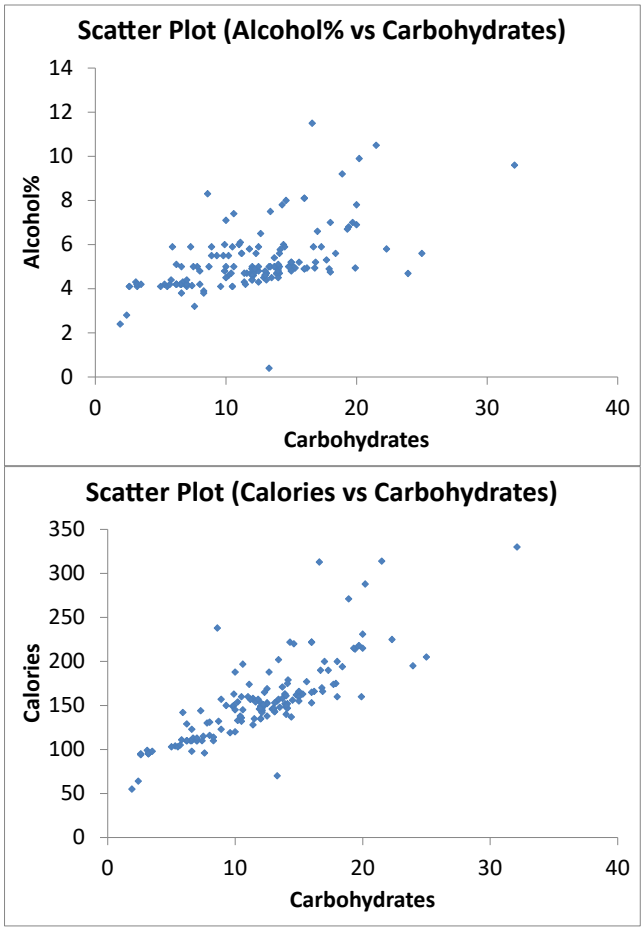




(b)



2.92 cont. (b)

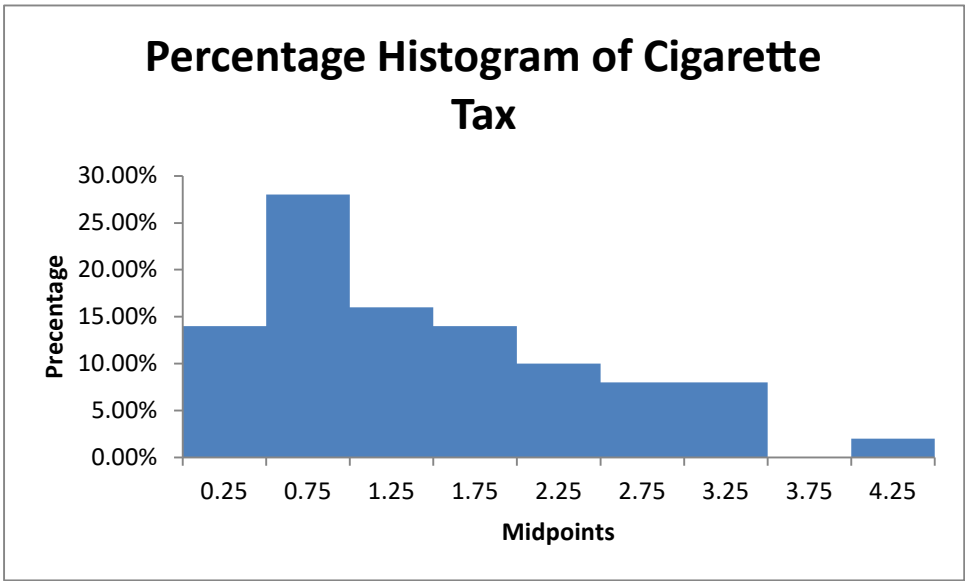


(c) The alcohol % is concentrated between 4 and 6, with more between 4 and 5. The calories are concentrated between 140 and 160. The carbohydrates are concentrated between 12 and 15. There are outliers in the percentage of alcohol in both tails. The outlier in the lower tail is due to the non-alcoholic beer O'Doul's with only a 0.4% alcohol content. There are a few beers with alcohol content as high as around 11.5%. There are a few beers with calories content as high as around 327.5 and carbohydrates as high as around 31.5.

There is a strong positive relationship between percentage alcohol and calories, and calories and carbohydrates and a moderately positive relationship between percentage alcohol and carbohydrates.

2.93 (a) Ordered array:
0.170, 0.300, 0.360, 0.370, 0.425, 0.440, 0.450, 0.550, 0.570, 0.570, 0.60, 0.600, 0.620, 0.640, 0.680, 0.790, 0.800, 0.840, 0.870, 0.980, 0.995, 1.030, 1.150, 1.180, 1.230, 1.250, 1.339, 1.360, 1.410, 1.530, 1.600, 1.600, 1.660, 1.680, 1.700, 1.700, 2.000, 2.000, 2.000, 2.000, 2.000, 2.510, 2.520, 2.620, 2.700, 3.025, 3.200, 3.400, 3.460, 4.350

(b)



(c) There is a 4.18% difference in the state cigarette tax between the lowest and highest. The distribution of the cigarette tax is somewhat right-skewed with one state having a cigarette tax higher than 4.0%. Majority of the states though have cigarette tax concentrated around 0.75%.

2.94 (a) One-year CD:

Statistics	
Sample Size	24
Mean	0.684167
Median	0.8
Std. Deviation	0.304201
Minimum	0.1
Maximum	1.05

Stem-and-Leaf Disp

Stem unit 0.1

1	05
2	55
3	
4	005
5	05
6	5
7	05
8	5568
9	000
10	00355

2.94 cont. (a) 5-year CD

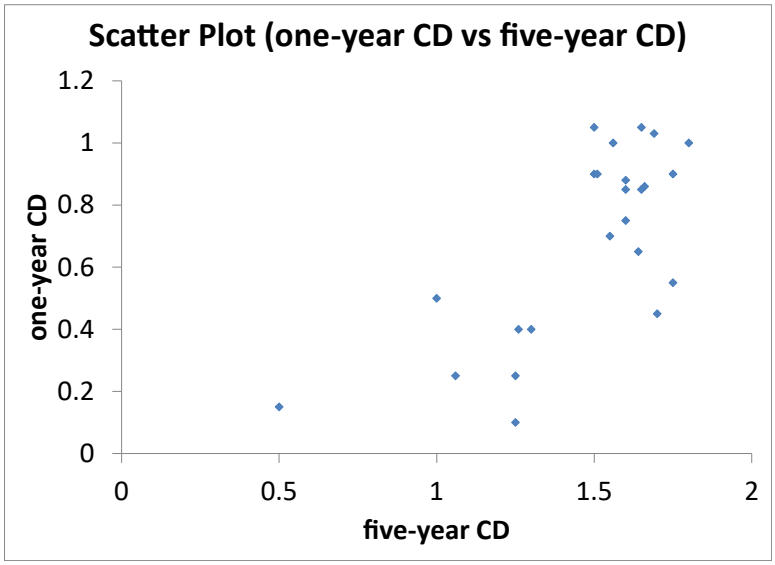
Statistics	
Sample Size	24
Mean	1.472083
Median	1.58
Std. Deviation	0.299637
Minimum	0.5
Maximum	1.8

Stem-and-Leaf Display

Stem unit 0.1

Stem	Leaf
5	0
6	
7	
8	
9	
10	06
11	
12	556
13	0
14	
15	00156
16	00045569
17	055
18	0

(b)

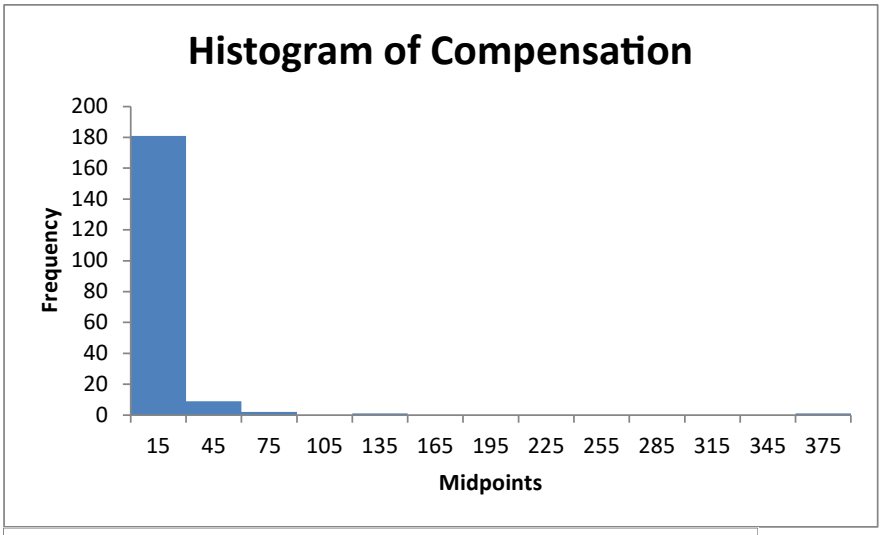


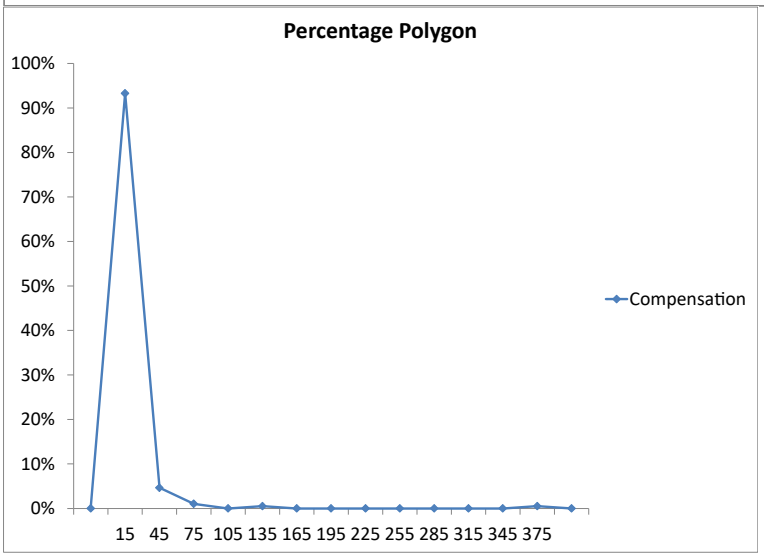
(c) There appears to be a positive relationship between the yield of the one-year CD and the five-year CD.

2.95 (a),(c)

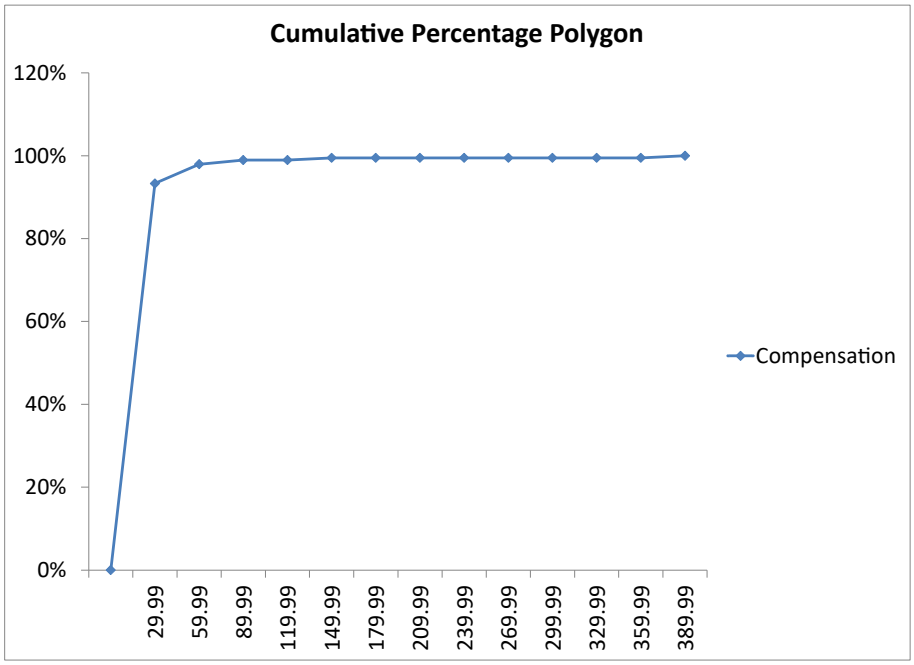
bin	Frequency	Percentage	Cumulative Pctage.	Midpts.
0 but less than 30	181	93.30%	93.30%	15
30 but less than 60	9	4.64%	97.94%	45
60 but less than 90	2	1.03%	98.97%	75
90 but less than 120	0	0.00%	98.97%	105
120 but less than 150	1	0.52%	99.48%	135
150 but less than 180	0	0.00%	99.48%	165
180 but less than 210	0	0.00%	99.48%	195
210 but less than 240	0	0.00%	99.48%	225
240 but less than 270	0	0.00%	99.48%	255
270 but less than 300	0	0.00%	99.48%	285
300 but less than 330	0	0.00%	99.48%	315
330 but less than 360	0	0.00%	99.48%	345
360 but less than 390	1	0.52%	100.00%	375

(b)



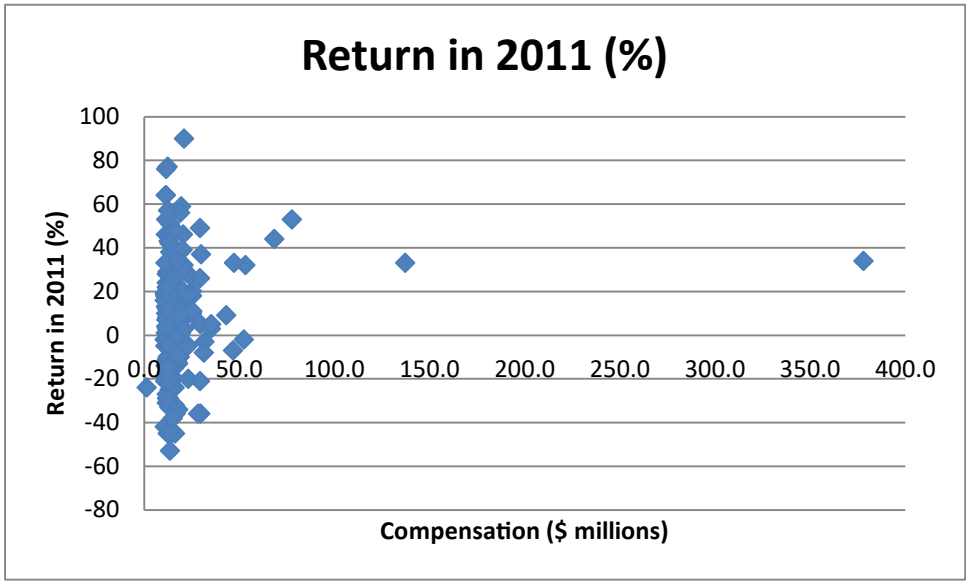


2.95 cont. (c)



(d) CEO compensation in 2011 is extremely right skewed. Slightly higher than 93% of the CEOs have compensation lower than $30,000,000

(e)



(f) There is not any obvious relationship between the total compensation and investment return in 2011.

2.96 (a)

Frequencies (Boston)

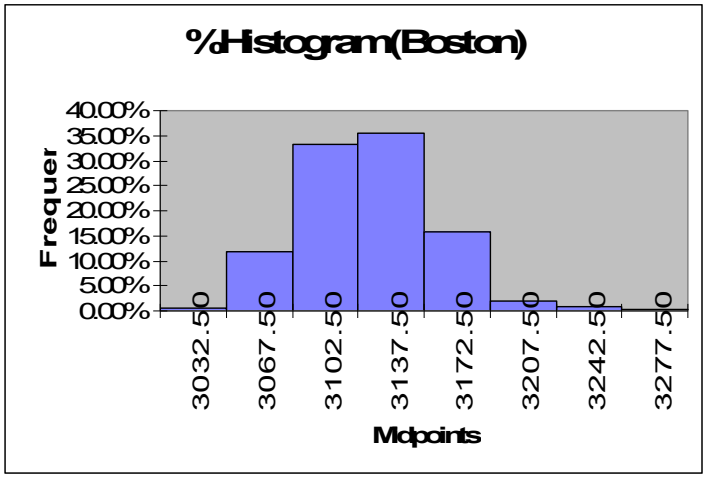
Weight (Boston)	*Frequency*	*Percentage*
3015 but less than 3050	2	0.54%
3050 but less than 3085	44	11.96%
3085 but less than 3120	122	33.15%
3120 but less than 3155	131	35.60%
3155 but less than 3190	58	15.76%
3190 but less than 3225	7	1.90%
3225 but less than 3260	3	0.82%
3260 but less than 3295	1	0.27%

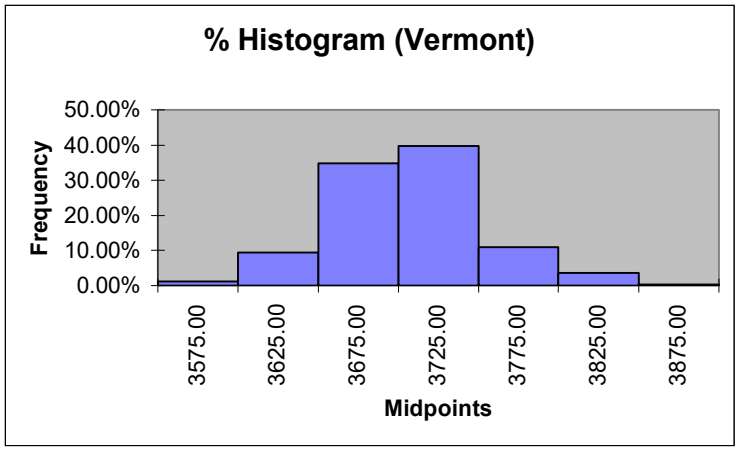
(b)

Frequencies (Vermont)

Weight (Vermont)	*Frequency*	*Percentage*
3550 but less than 3600	4	1.21%
3600 but less than 3650	31	9.39%
3650 but less than 3700	115	34.85%
3700 but less than 3750	131	39.70%
3750 but less than 3800	36	10.91%
3800 but less than 3850	12	3.64%
3850 but less than 3900	1	0.30%

(c)





2.96 cont. (d) 0.54% of the "Boston" shingles pallets are underweight while 0.27% are overweight. 1.21% of the "Vermont" shingles pallets are underweight while 3.94% are overweight.

2.97 (a),(c) Two-star:

bin	Frequency	Percentage	Cumulative Pctage.	Midpts.
15 but less than 25	2	3.85%	3.85%	20
25 but less than 35	4	7.69%	11.54%	30
35 but less than 45	7	13.46%	25.00%	40
45 but less than 55	6	11.54%	36.54%	50
55 but less than 65	6	11.54%	48.08%	60
65 but less than 75	16	30.77%	78.85%	70
75 but less than 85	8	15.38%	94.23%	80
85 but less than 95	1	1.92%	96.15%	90
95 but less than 105	0	0.00%	96.15%	100
105 but less than 115	2	3.85%	100.00%	110

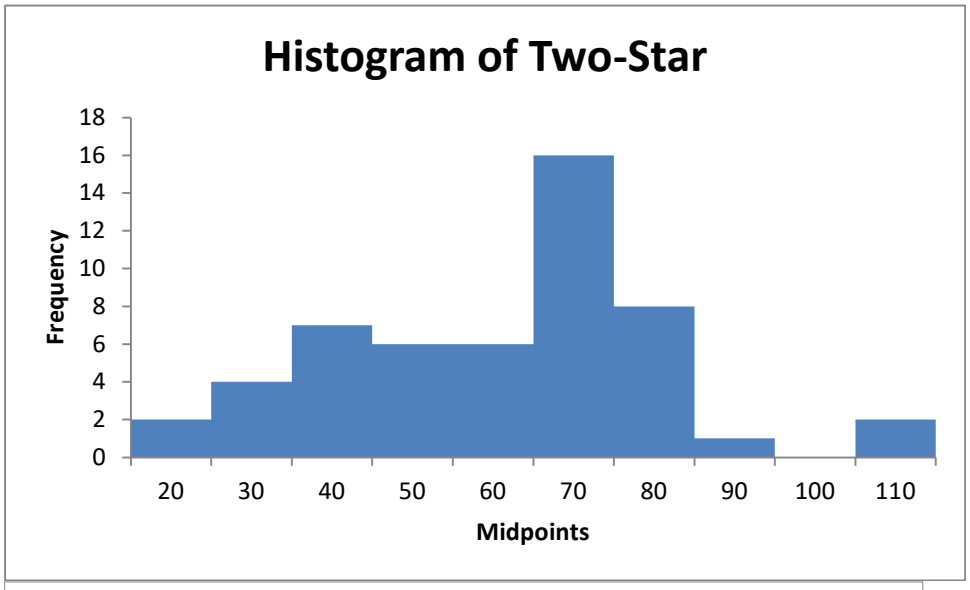
Three-star:

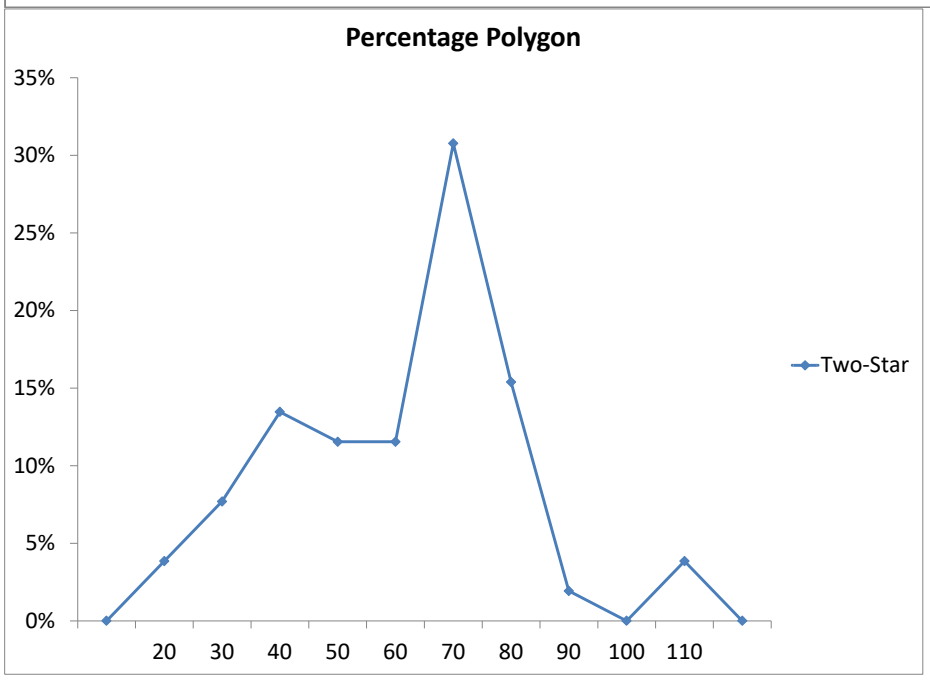
bin	Frequency	Percentage	Cumulative Pctage.	Midpts.
25 but less than 40	1	1.92%	1.92%	32.5
40 but less than 55	6	11.54%	13.46%	47.5
55 but less than 70	7	13.46%	26.92%	62.5
70 but less than 85	9	17.31%	44.23%	77.5
85 but less than 100	13	25.00%	69.23%	92.5
100 but less than 115	10	19.23%	88.46%	107.5
115 but less than 130	3	5.77%	94.23%	122.5
130 but less than 145	2	3.85%	98.08%	137.5
145 but less than 160	1	1.92%	100.00%	152.5

Four-star:

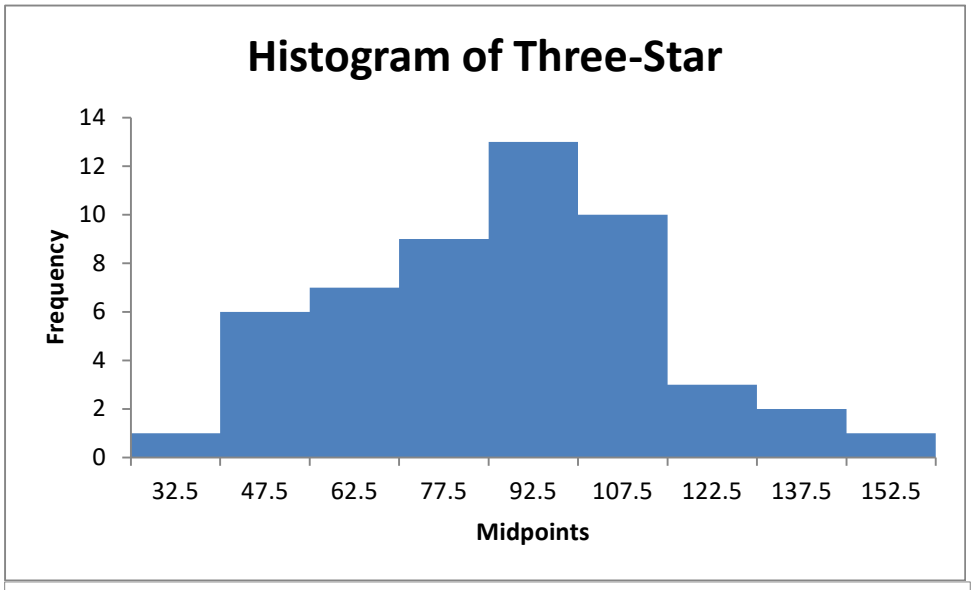
bin	Frequency	Percentage	Cumulative Pctage.	Midpts.
55 but less than 70	3	5.77%	5.77%	62.5
70 but less than 85	8	15.38%	21.15%	77.5
85 but less than 100	5	9.62%	30.77%	92.5
100 but less than 115	7	13.46%	44.23%	107.5
115 but less than 130	8	15.38%	59.62%	122.5
130 but less than 145	8	15.38%	75.00%	137.5
145 but less than 160	6	11.54%	86.54%	152.5
160 but less than 175	3	5.77%	92.31%	167.5
175 but less than 190	3	5.77%	98.08%	182.5
190 but less than 205	1	1.92%	100.00%	197.5
205 but less than 220	0	0.00%	100.00%	212.5

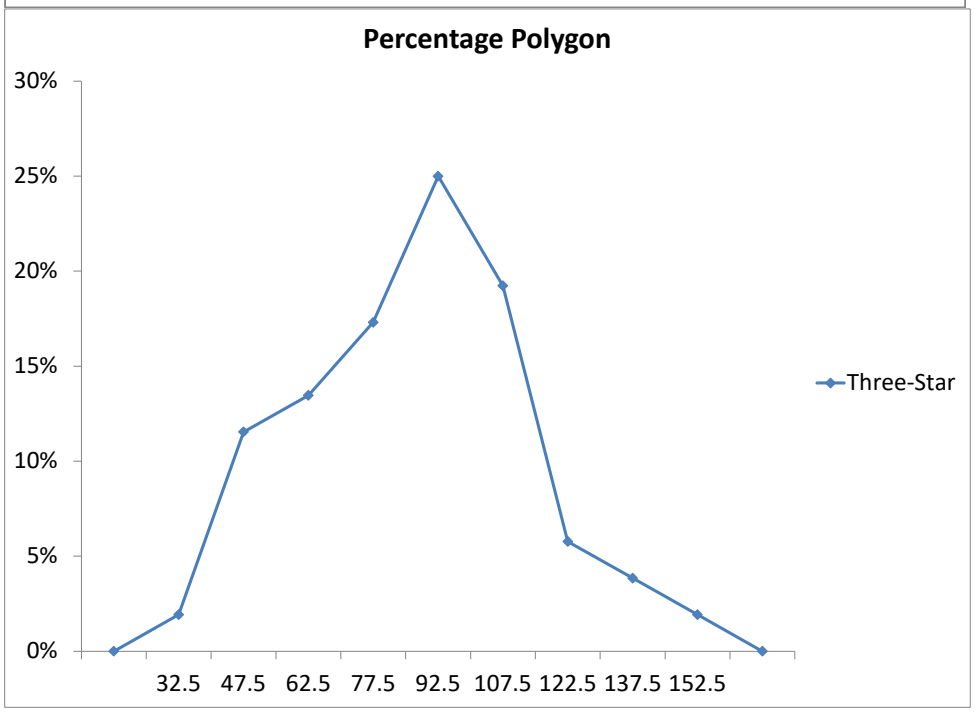
2.97 cont. (b) **Two-star:**



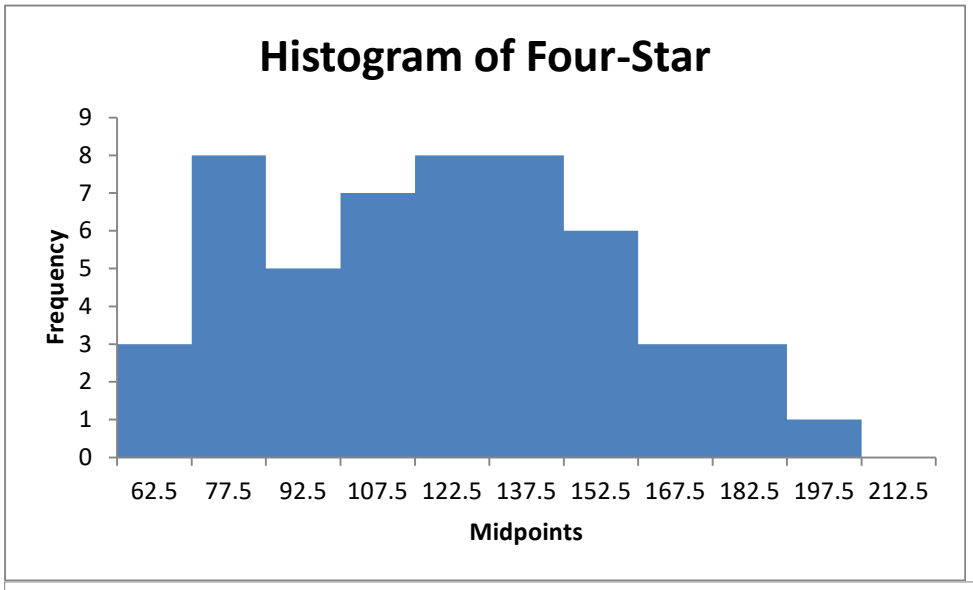


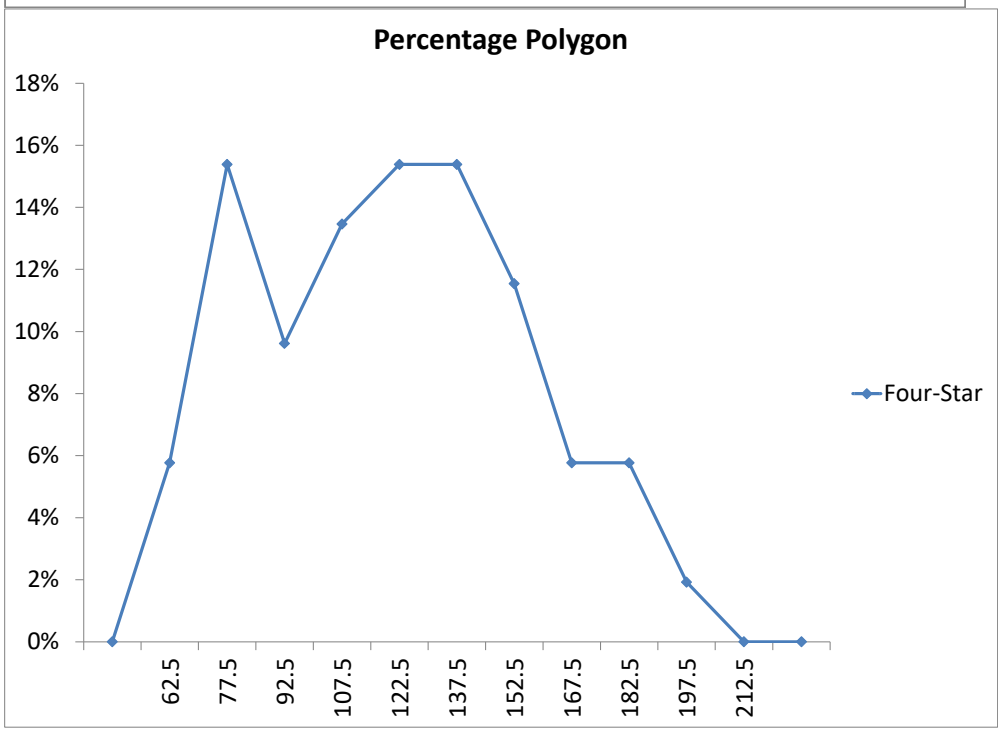
2.97 cont. (b) **Three-star:**



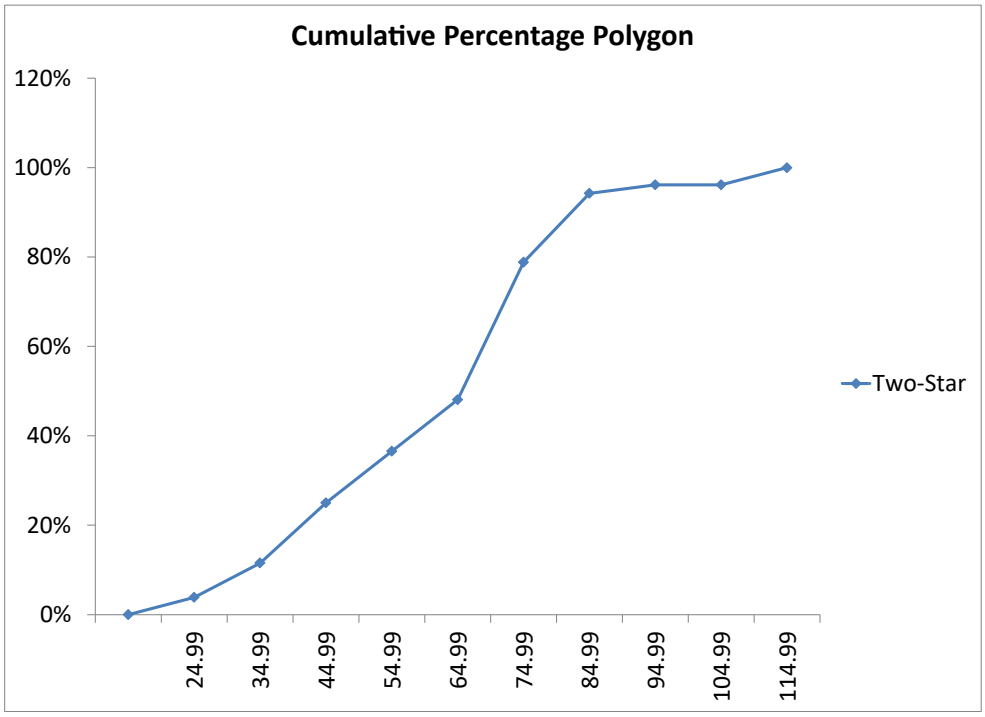


2.97 cont. (b) **Four-star:**

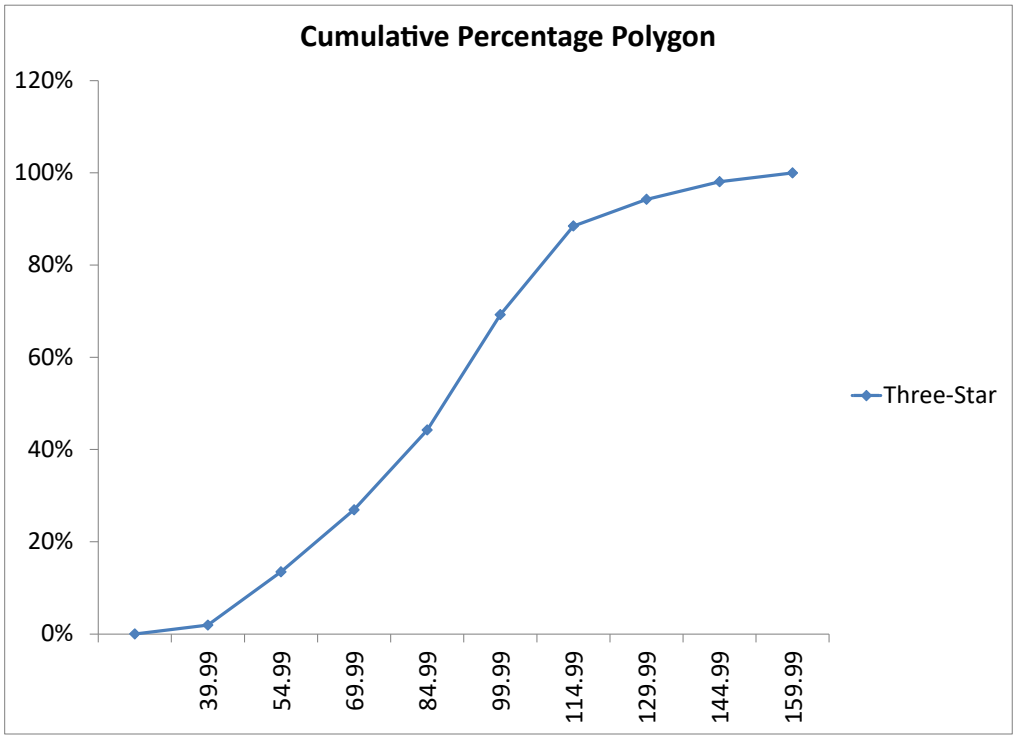




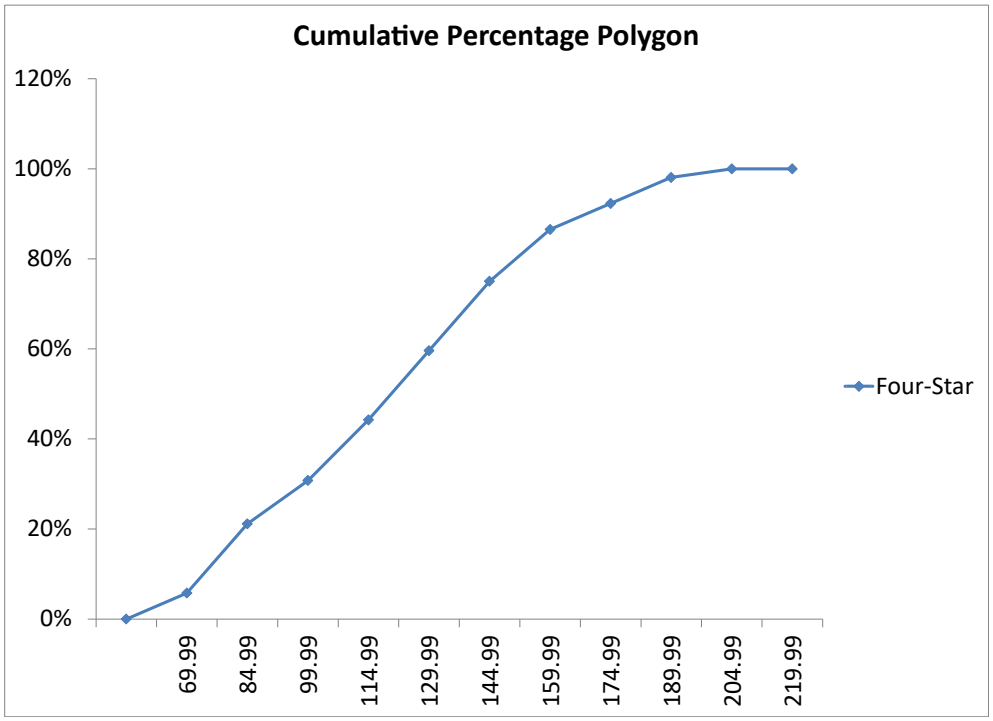
2.97 cont. (c) **Two-star:**



Three-star:

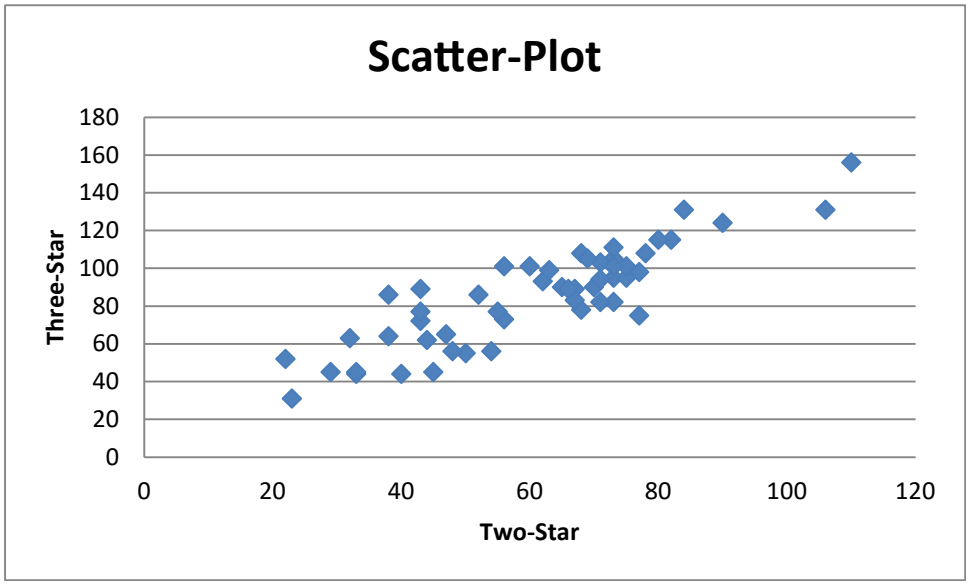


2.97 cont. (c) **Four-star:**

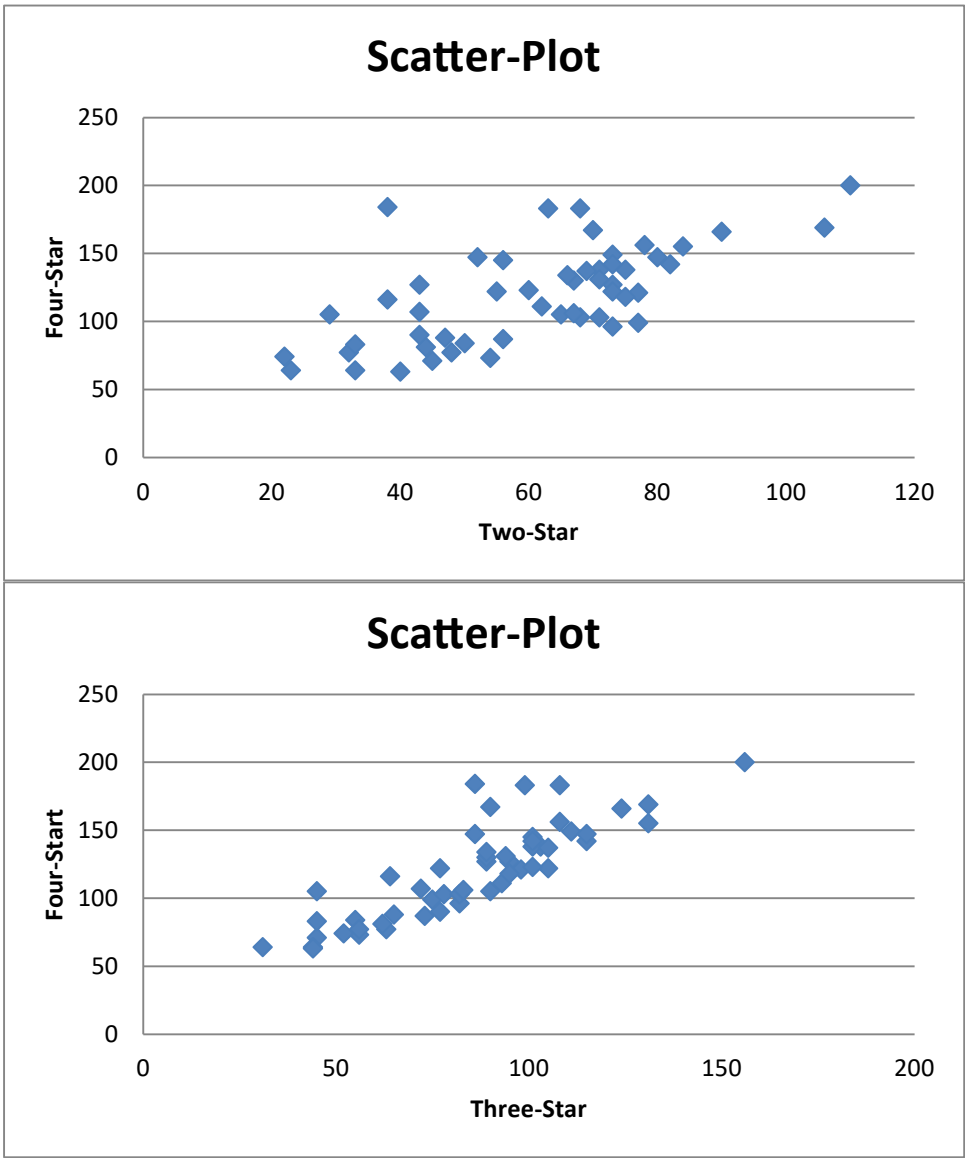


(d) The price of two-star, three-star and four-star hotels are all right-skewed. The median price of two-star , three-star and four-star hotels is around 65, 85, and 115 English pounds, respectively.

(e)



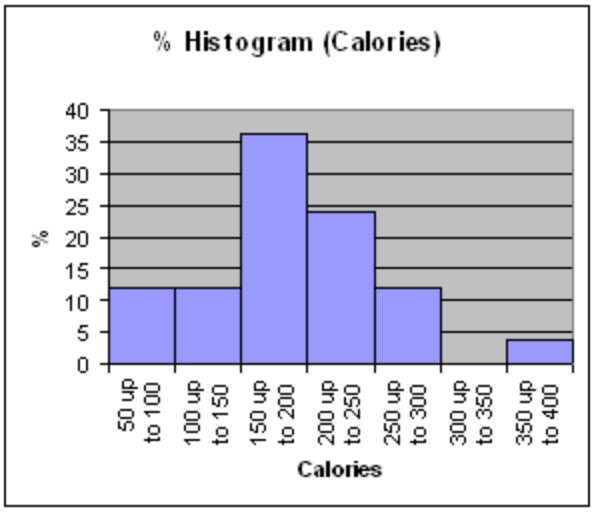
2.97 cont. (e)



(f) The relationship of the price between two-star and three-star, three-star and four-star, and two-star and four-star hotels are all positve.

2.98 (a)

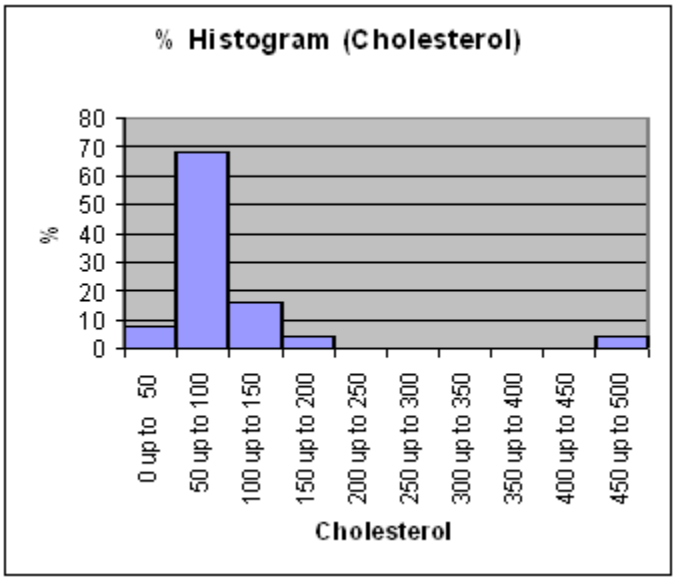
Calories	Frequency	Percentage	Percentage Less Than
50 up to 100	3	12%	12%
100 up to 150	3	12	24
150 up to 200	9	36	60
200 up to 250	6	24	84
250 up to 300	3	12	96
300 up to 350	0	0	96
350 up to 400	1	4	100



(b)

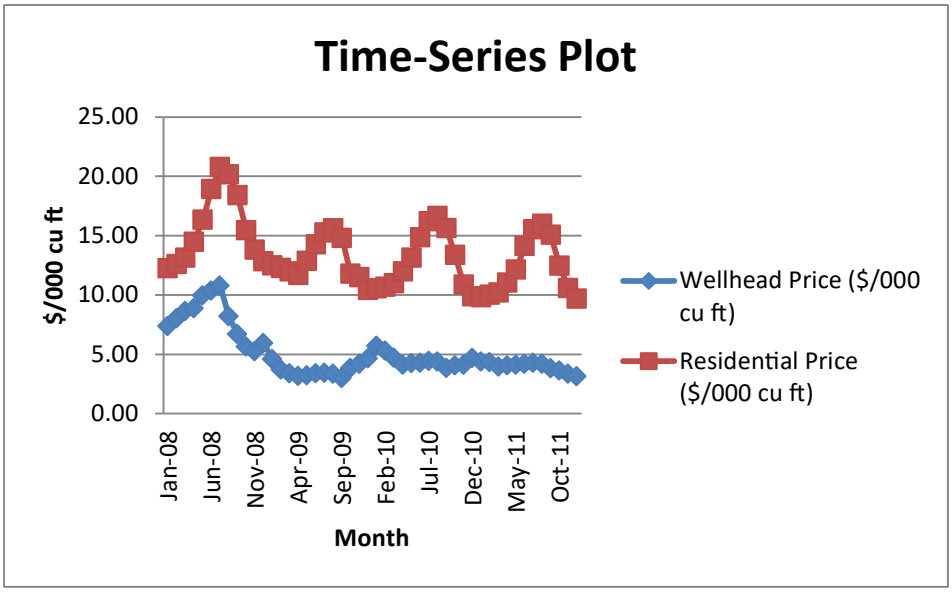
Cholesterol	Frequency	Percentage	Percentage Less Than
0 up to 50	2	8	8%
50 up to 100	17	68	76
100 up to 150	4	16	92
150 up to 200	1	4	96
200 up to 250	0	0	96
250 up to 300	0	0	96
300 up to 350	0	0	96
350 up to 400	0	0	96
400 up to 450	0	0	96
450 up to 500	1	4	100

2.98 (b) cont.



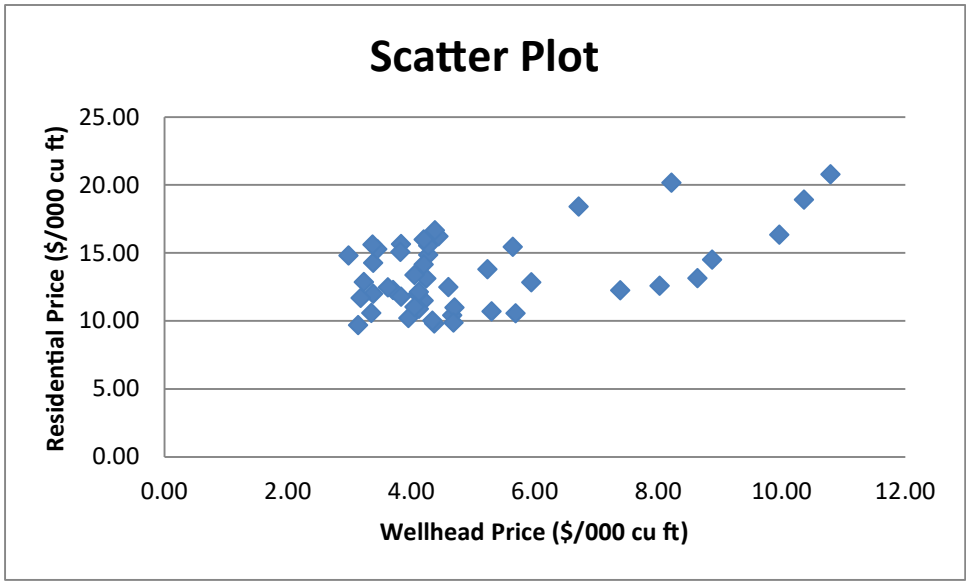
(c) The sampled fresh red meats, poultry, and fish vary from 98 to 397 calories per serving, with the highest concentration between 150 to 200 calories. One protein source, spareribs, with 397 calories, is more than 100 calories above the next highest caloric food. The protein content of the sampled foods varies from 16 to 33 grams, with 68% of the data values falling between 24 and 32 grams. Spareribs and fried liver are both very different from other foods sampled—the former on calories and the latter on cholesterol content.

2.99 (a)



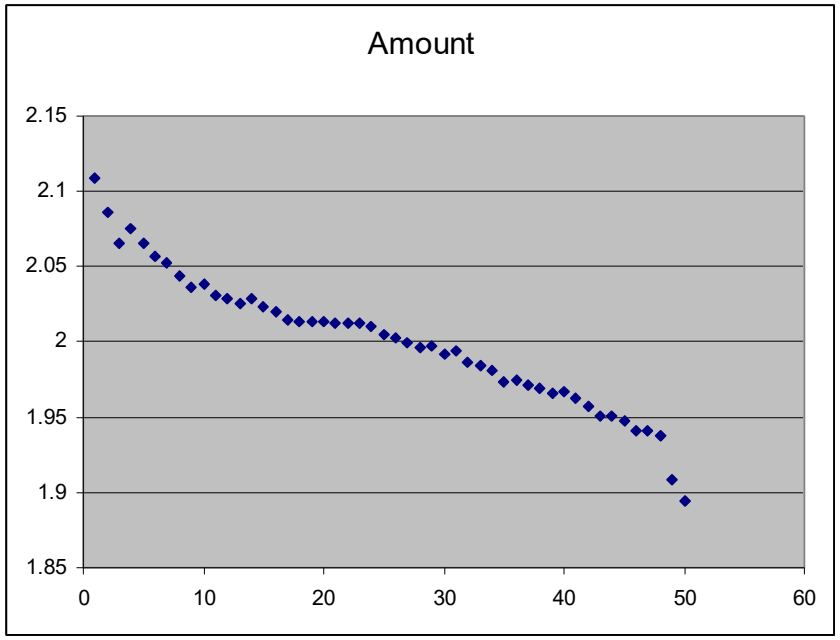
2.99 cont. (b) The wellhead average price was highest in the summer of 2008 and had since declined. The residential average price of gasoline in the United States is higher in the summer in general and seems to peak in June.

(c)



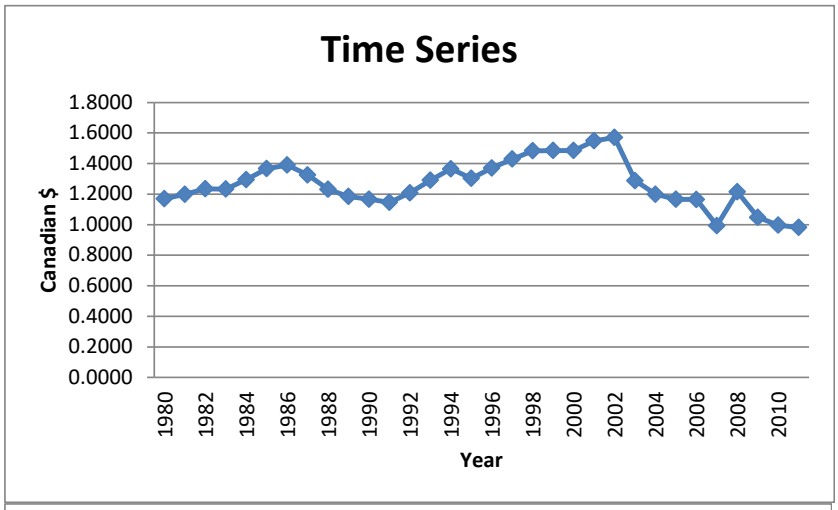
(d) There appears to be a slight positive relationship between the wellhead price and residential price.

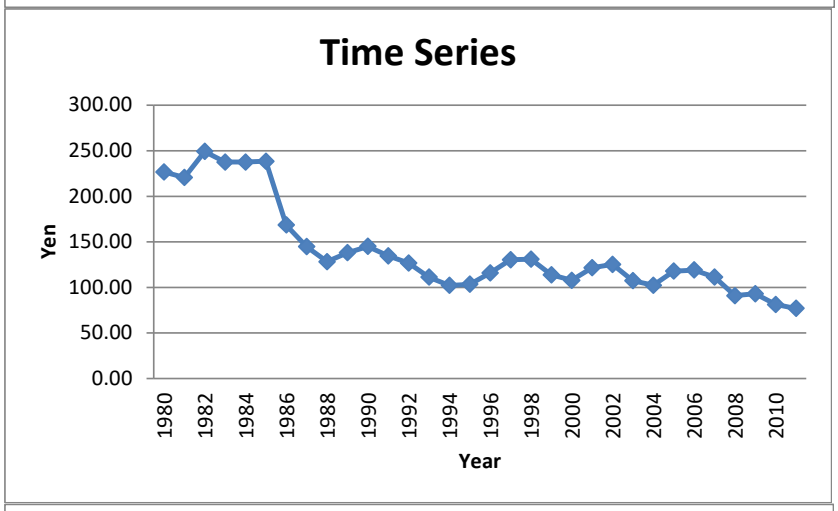
2.100 (a)

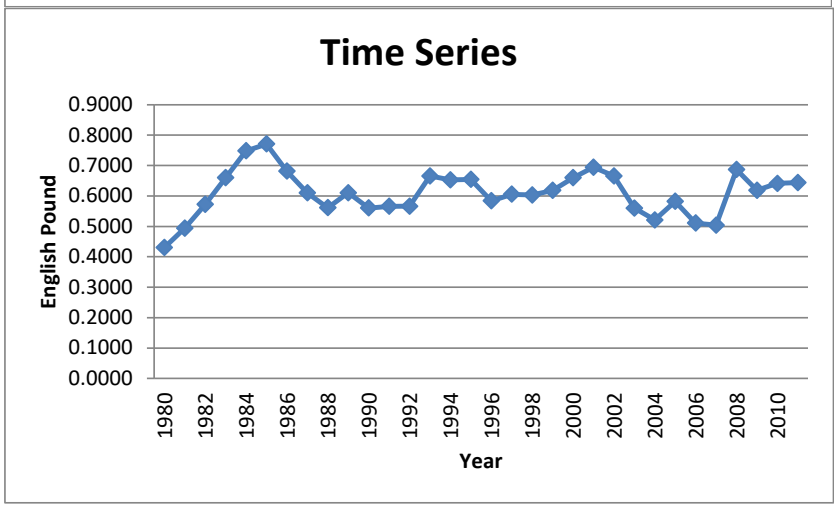


(b) There is a downward trend in the amount filled.
(c) The amount filled in the next bottle will most likely be below 1.894 liter.
(d) The scatter plot of the amount of soft drink filled against time reveals the trend of the data, whereas a histogram only provides information on the distribution of the data.

2.101 (a)



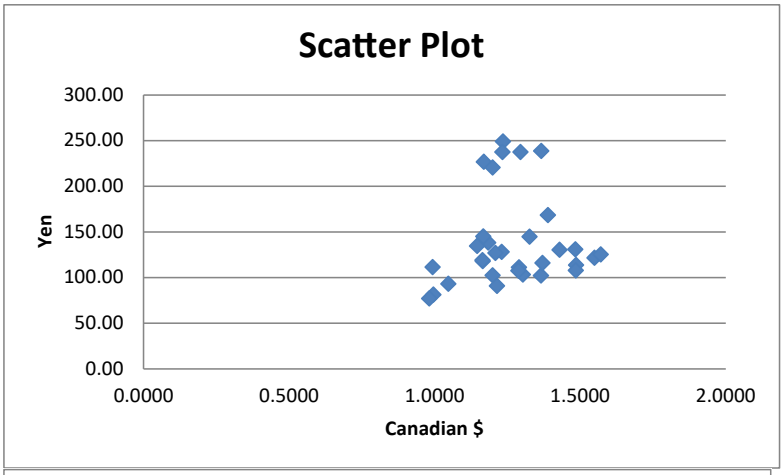


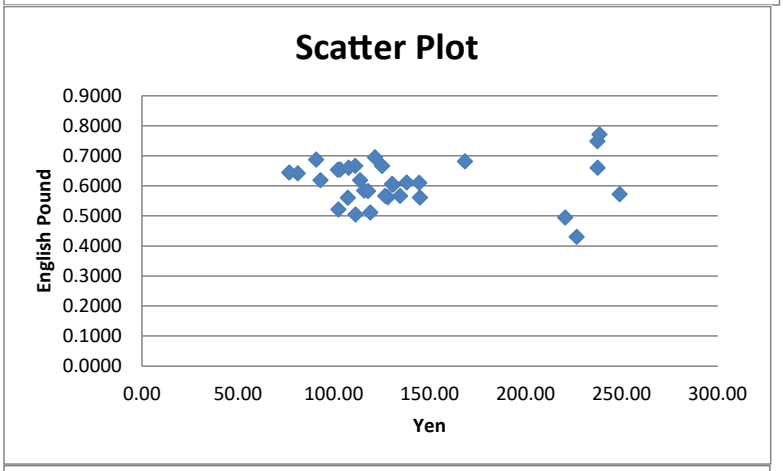


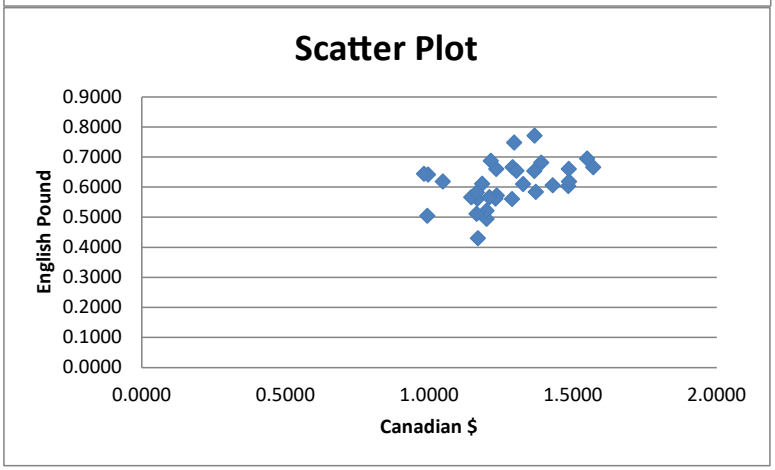
2.101 (b) The Japanese yen had depreciated against the U.S. dollar since 1982 while the Canadian dollar appreciated gradually from 1980 to 1987 and from 1991 to 2002 and then started to depreciate since. The English pound to U.S. dollar's exchange rate has been quite stable since 1983.

(c) The U.S. dollar has appreciated against the Japanese yen since 1980 and appreciated against the Canadian dollar since 2001 in general while the exchange rate against the English bound has been stable in general.

(d)







2.101 (e) cont. There is not any obvious relationship between the Canadian dollar and Japanese yen in terms of the U.S. dollar nor any relationship between the Japanese yen and English pound. There is a slightly positive relationship between the Canadian dollar and English pound which reflects the fact that when the Canadian dollar appreciated against the U.S. dollar, so did the English pound.