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 Answers will vary.

(a) You can conclude that Android smartphones have seen steady increase in market shares while Blackberry and Other OS smartphones have seen steady decrease in market shares since 2011. Android smartphones dominated the market in all those three years.

(b) The iOS smartphones have overtaken Other OS smartphones and owned the second largest market share since 2012. The Microsoft smartphones have arisen to the third place in terms of market share in 2013 from the fifth place position in 2011 while the Other OS smartphones have dropped from the second place in 2011 to the last place in 2013 and last but one in 2014.

2.4 (a) The percentage of complaints for each automaker:

Automaker	Frequency	Percentage	Cumulative Pct.
General Motors	551	18.91%	18.91%
Other	516	17.71%	36.62%
Nissan Motors Corporation	467	16.03%	52.64%
Ford Motor Company	440	15.10%	67.74%
Chrysler LLC	439	15.07%	82.81%
Toyota Motor Sales	332	11.39%	94.20%
American Honda	169	5.80%	100.00%

(b) General Motors has the most complaints, followed by Other, Nissan Motors Corporation, Ford Motor Company, Chryler LLC, Toyota Motor Sales and American Honda.

(c) The percentage of complaints for each category:

Category	Frequency	Percentage	Cumulative Pct.
Powertrain	1148	42.82%	42.82%
Steering	397	14.81%	57.63%
Interior Electronics/Hardware	279	10.41%	68.03%
Fuel/Emission/Exhaust System	240	8.95%	76.99%
Airbags and Seatbelts	201	7.50%	84.48%
Body and Glass	182	6.79%	91.27%
Brakes	163	6.08%	97.35%
Tires and Wheels	71	2.65%	100.00%

(d) Powertrain has the most complaints, followed by steering, interior electronics/hardware, fuel/emission/exhaust system, airbags and seatbelts, body and glass, brakes, and, finally, tires and wheels.

2.5 Answers will vary.
"High pay" has the highest percentage at 23%, followed closely by "good work-life balance" at 22%.

2.6 (a)

Region	Oil Production	Percentage
	(millions of barrels a day)	
Iran	2.69	3.27%
Saudi Arabia	9.58	11.66%
Other OPEC countries	17.93	21.82%
Non-OPEC countries	51.99	63.26%
Total	82.19	100.00%

(b) More than half the oil produced is from non-OPEC countries. About 22% is produced by OPEC countries other than Iran and Saudi Arabia.

2.7 (a) The percentage of values for each response need:

Barriers	Frequency	%
Data must be integrated from multiple sources	68	22.67%
Lack of automation/repeatable process	51	17.00%
Metrics need to be identified or defined	45	15.00%
Production is cumbersome	42	14.00%
Data quality is not reliable	36	12.00%
Sharing findings is challenging	21	7.00%
Analytic tools are too complex	17	5.67%
Ensuring security and integrity of workforce data	17	5.67%
Other	3	1.00%
Total	300	100.00%

(b) Answer will vary. "Data must be integrated from multiple sources" is the most frequently mentioned need, followed by "Lack of automation/repeatable process", "Metrics need to be identified or defined", "Production is cumbersome" and "Data quality is not reliable".

2.8 (a) Table of total percentages

	Gender		
Influenced	Male	Female	Total
Yes	5%	10%	15%
No	45%	40%	85%
Total	50%	50%	100%

Table of row percentages

	Gender		
Influenced	Male	Female	Total
Yes	34%	66%	100%
No	53%	47%	100%
Total	50%	50%	100%

Table of column percentages

	Gender		
Influenced	Male	Female	Total
Yes	10%	20%	15%
No	90%	80%	85%
Total	100%	100%	100%

(b) Answer will vary. A higher percentage of females are influenced by social media.

2.9 (a)

Table of total percentages:

	Outcome		
Category	Successful	Not Successful	Total
Film & Video	16%	25%	41%
Games	5%	9%	14%
Music	18%	16%	34%
Technology	2%	8%	11%
Total	41%	59%	100%

Note: The numbers in the Total column may not appear to be the sum of the different outcomes due to rounding.

Table of row percentages:

	Outcome		
Category	Successful	Not Successful	Total
Film & Video	39%	61%	100%
Games	34%	66%	100%
Music	53%	47%	100%
Technology	23%	77%	100%
Total	41%	59%	100%

Table of column percentages:

	Outcome		
Category	Successful	Not Successful	Total
Film & Video	39%	43%	41%
Games	12%	16%	14%
Music	44%	27%	34%
Technology	6%	14%	11%
Total	100%	100%	100%

(b) The row percentages is most informative for these data as they show that among the different categories, music is the most successful at 53% while technology is most unsuccessful at only 23%.

(c) Answer may vary. Music is the most successful at 53% followed by film & video at 39%, games at 34% and finally technology at 23%.

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

Average Time to Resolve Cyberattacks	Frequency	%	Cumulative %
Less than 1 day	101	29.97%	29.97%
Between 1 and less than 3 days	115	34.12%	64.09%
Between 3 and less than 7 days	47	13.95%	78.04%
Between 7 and less than 14 days	30	8.90%	86.94%
14 days or more	44	13.06%	100.00%
Total	337	100.00%	

(a) 64.09% of small businesses took less than 3 days, on average, to resolve cyberattacks.

(b) 56.97% of small businesses took between 1 and less than 14 days, on average, to resolve cyberattacks.

(c) 35.91% of small businesses took 3 or more days, on average, to resolve cyberattacks.

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 ($)	212.40	221.80	223.92	232.44	245.39	258.78	261.20	263.10
	271.74	275.74	278.90	280.28	281.06	289.71	295.40	312.20
	317.08	322.50	325.85	336.52	340.60	341.90	369.86	404.60
	435.72	444.16	468.20	477.32	541.00	676.42		

(b) PHStat output:

Cost			Frequency	Percentage	Cumulative Pctage.	Midpts.
200	but less than	260	6	20.00%	20.00%	230
260	but less than	320	11	36.67%	56.67%	290
320	but less than	380	6	20.00%	76.67%	350
380	but less than	440	2	6.67%	83.33%	410
440	but less than	500	3	10.00%	93.33%	470
500	but less than	560	1	3.33%	96.67%	530
560	but less than	620	0	0.00%	96.67%	590
620	but less than	680	1	3.33%	100.00%	650

(c) The costs of attending a basketball game is concentrating between $200 and $380.

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) Annual Time Sitting in Traffic (hours)

Bin Cell	Frequency	Percentage	Cumulative Pctage.
15 but less than 20	1	3.23%	3.23%
20 but less than 25	4	12.90%	16.13%
25 but less than 30	4	12.90%	29.03%
30 but less than 35	2	6.45%	35.48%
35 but less than 40	7	22.58%	58.06%
40 but less than 45	3	9.68%	67.74%
45 but less than 50	4	12.90%	80.65%
50 but less than 55	2	6.45%	87.10%
55 but less than 60	1	3.23%	90.32%
60 but less than 65	1	3.23%	93.55%
65 but less than 70	0	0.00%	93.55%
70 but less than 75	2	6.45%	100.00%

Cost of Sitting in Traffic($)

Bin Cell	Frequency	Percentage	Cumulative Pctage.
300 but less than 450	4	12.90%	12.90%
450 but less than 600	6	19.35%	32.26%
600 but less than 750	6	19.35%	51.61%
750 but less than 900	5	16.13%	67.74%
900 but less than 1050	6	19.35%	87.10%
1050 but less than 1200	2	6.45%	93.55%
1200 but less than 1350	1	3.23%	96.77%
1350 but less than 1550	0	0.00%	96.77%
1550 but less than 1650	1	3.23%	100.00%

2.17 cont. (c) The annual time sitting in traffic is concentrated around 37.5 hours with a few spending as much as around 72.5 hours.

(d) The cost of sitting in traffic per year is concentrated around $675 with one costing as much as $1,575.

2.18 (a), (b)

	Credit Score		Frequency	Percentage	Cumulative Pctage.	Midpts.
600	but less than	610	1	0.70%	0.70%	615
610	but less than	620	0	0.00%	0.70%	625
620	but less than	630	2	1.40%	2.10%	635
630	but less than	640	15	10.49%	12.59%	645
640	but less than	650	18	12.59%	25.17%	655
650	but less than	660	24	16.78%	41.96%	665
660	but less than	670	22	15.38%	57.34%	675
670	but less than	680	28	19.58%	76.92%	685
680	but less than	690	21	14.69%	91.61%	695
690	but less than	700	11	7.69%	99.30%	705
700	but less than	710	1	0.70%	100.00%	715

Note: Due to rounding, some of the numbers in the table may not add up.

(c) The average credit scores are concentrated around 630 and 690.

2.19 (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.

2.20 (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.

2.21 (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.

2.22 (a), (b) Manufacturer A:

Bin Cell	Frequency	Percentage	Cumulative Pctage.
6,500 but less than 7,500	3	7.50%	7.50%
7,500 but less than 8,500	5	12.50%	20.00%
8,500 but less than 9,500	20	50.00%	70.00%
9,500 but less than 10,500	9	22.50%	92.50%
10,500 but less than 11,500	3	7.50%	100.00%

Manufacturer B:

Bin Cell	Frequency	Percentage	Cumulative Pctage.
7,500 but less than 8,500	2	5.00%	5.00%
9,500 but less than 9,500	8	20.00%	25.00%
9,500 but less than 10,500	16	40.00%	65.00%
10,500 but less than 11,500	9	22.50%	87.50%
11,500 but less than 12,500	5	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 10,500 hours, contrasted with 70% of Manufacturer A's bulbs, which lasted less than 9,500 hours. None of Manufacturer A's bulbs lasted more than 11,499 hours, but 12.5% of Manufacturer B's bulbs lasted between 11,500 and 12,499 hours. At the same time, 7.5% of Manufacturer A's bulbs lasted less than 7,500 hours, whereas all of Manufacturer B's bulbs lasted at least 7,500 hours

2.23 (a)

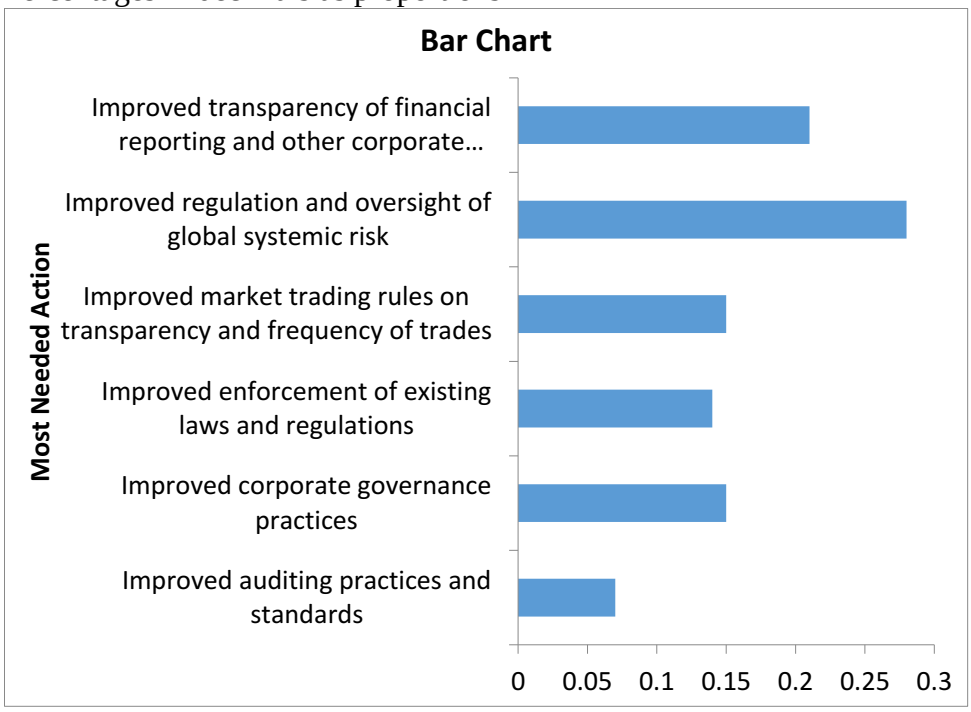
Amount of Soft Drink	Frequency	Percentage
1.850 – 1.899	1	2%
1.900 – 1.949	5	10
1.950 – 1.999	18	36
2.000 – 2.049	19	38
2.050 – 2.099	6	12
2.100 – 2.149	1	2

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

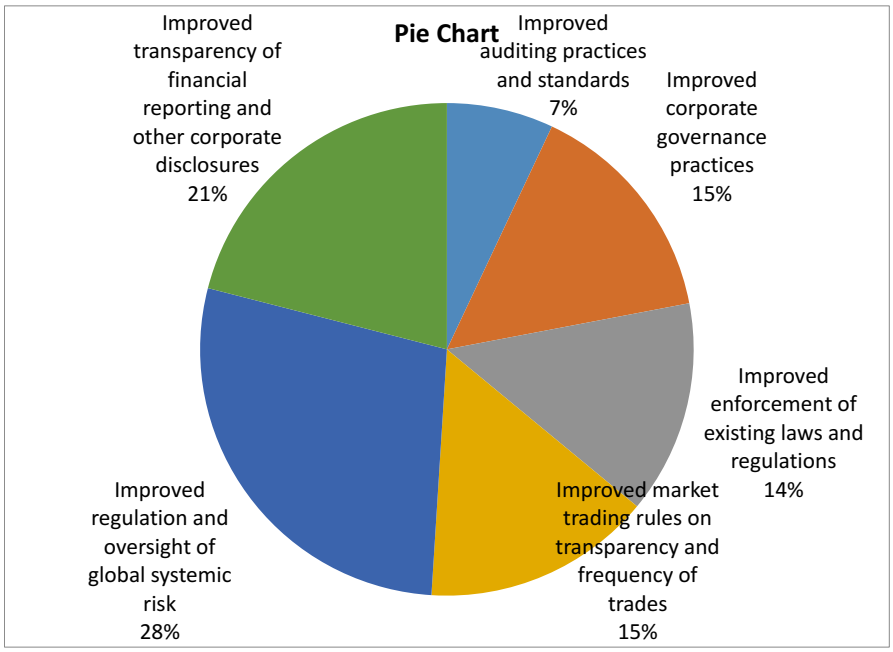
(b) The amount of soft drink filled in the two liter bottles is most concentrated in two intervals on either side of the two-liter mark, from 1.950 to 1.999 and from 2.000 to 2.049 liters. Almost three-fourths of the 50 bottles sampled contained between 1.950 liters and 2.049 liters.

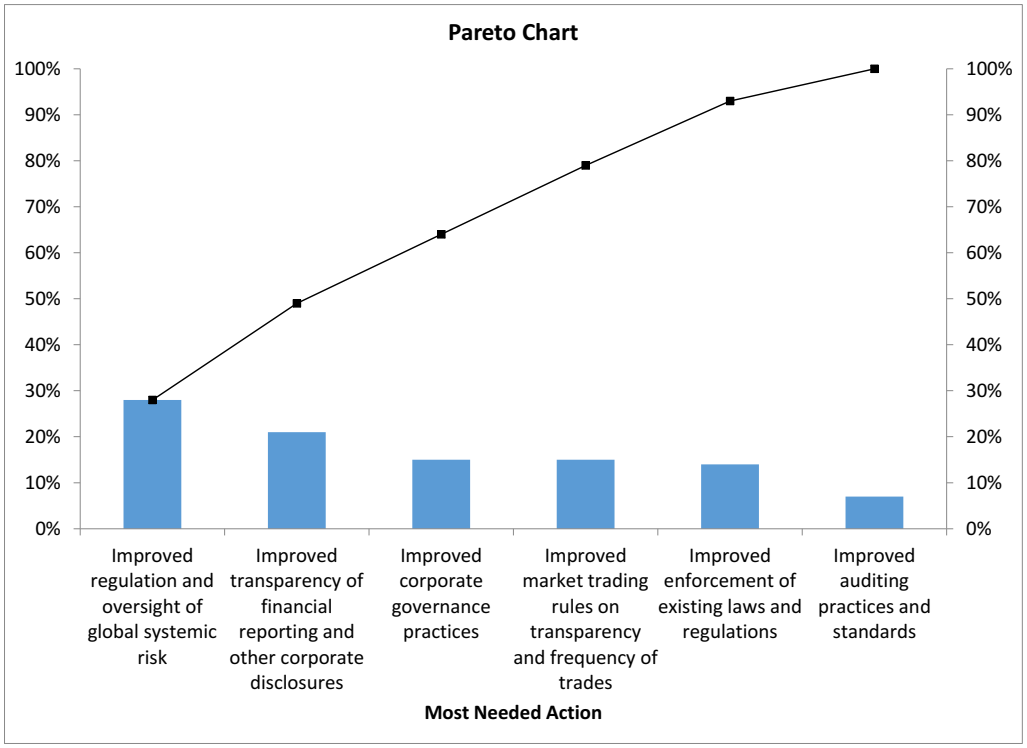
2.24 (a)

Percentages in decimals as proportions



2.24 cont. (a)

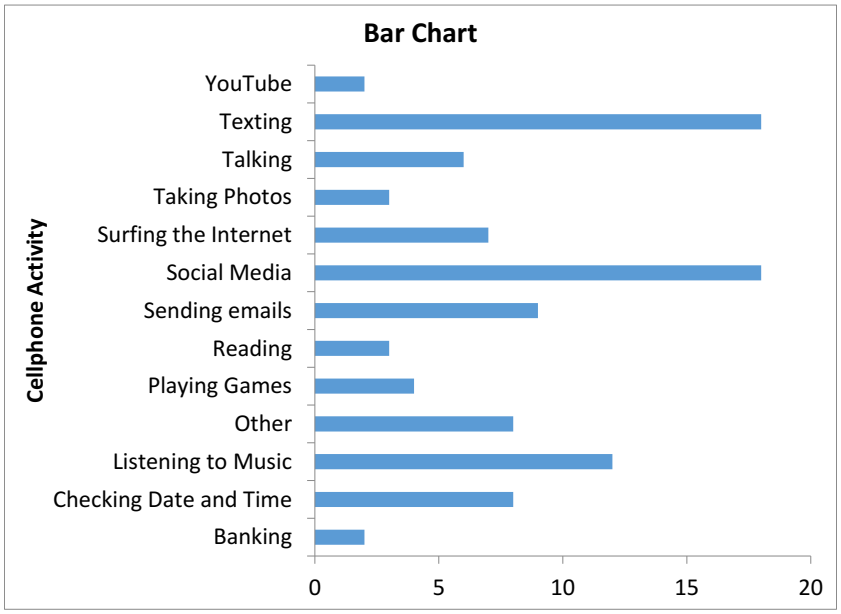


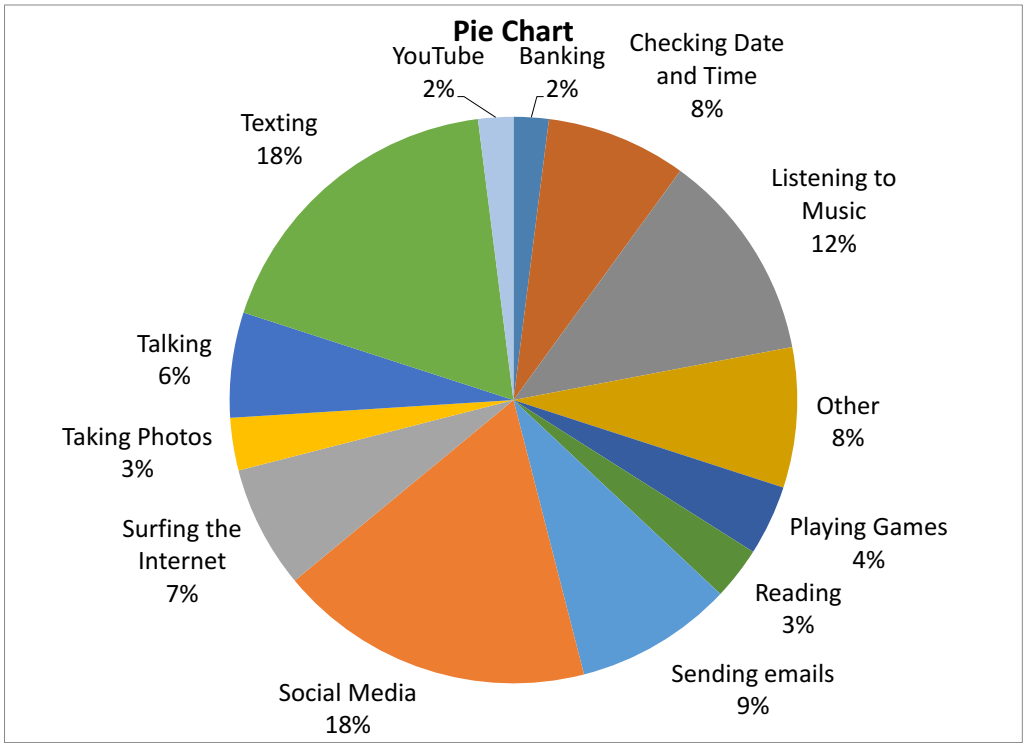


(b) The Pareto diagram is better than the pie chart to portray these data because it not only sorts the frequencies in descending order, it also provides the cumulative polygon on the same scale.

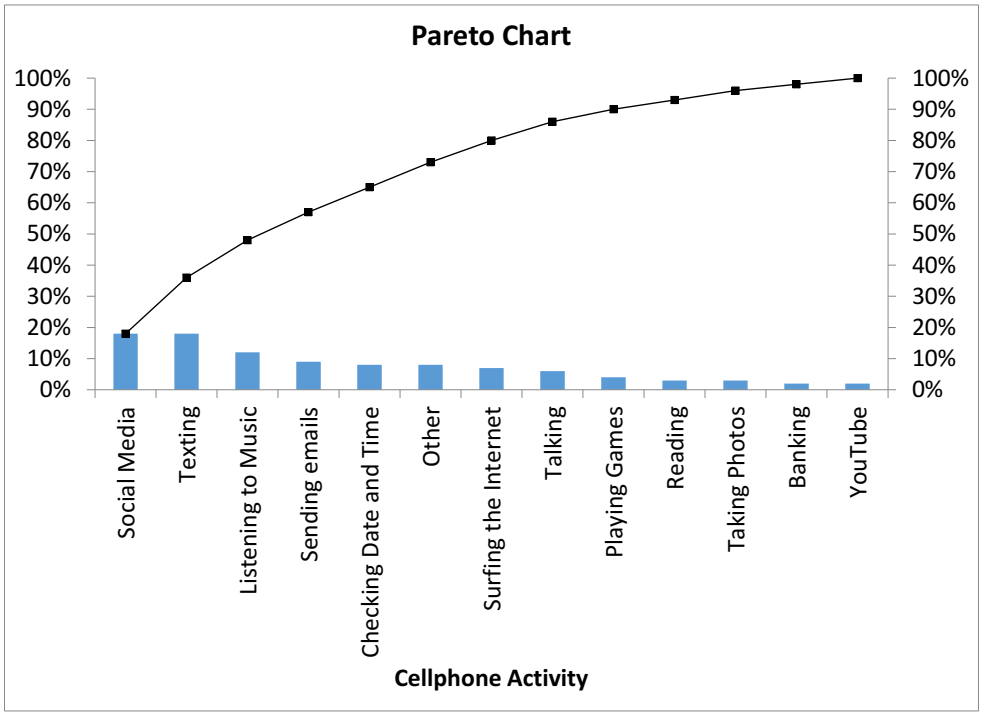
(c) You can conclude that "improved regulation and oversight of global systemic risk" accounts for the largest percentage (28%) of the most needed action to improve investor trust and market integrity.

2.25 (a)


Bar Chart
Cellphone Activity
YouTube
Texting
Talking
Taking Photos
Surfing the Internet
Social Media
Sending emails
Reading
Playing Games
Other
Listening to Music
Checking Date and Time
Banking
0
5
10
15
20


Pie Chart
YouTube 2%
Banking 2%
Checking Date and Time 8%
Texting 18%
Listening to Music 12%
Talking 6%
Other 8%
Taking Photos 3%
Playing Games 4%
Surfing the Internet 7%
Reading 3%
Sending emails 9%
Social Media 18%

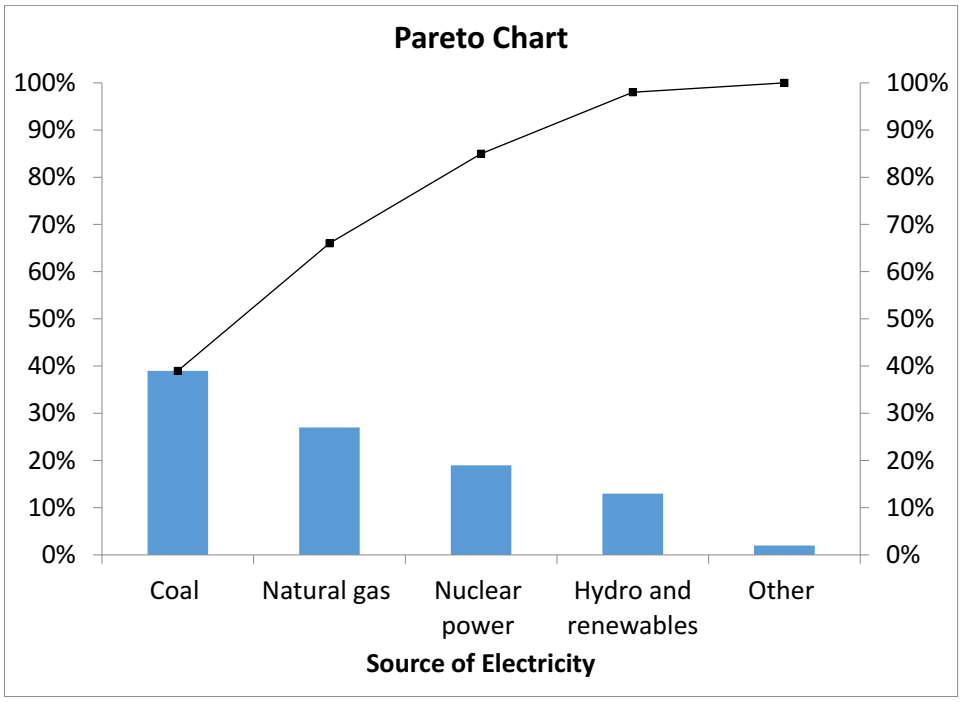
2.25 cont. (a)



(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.

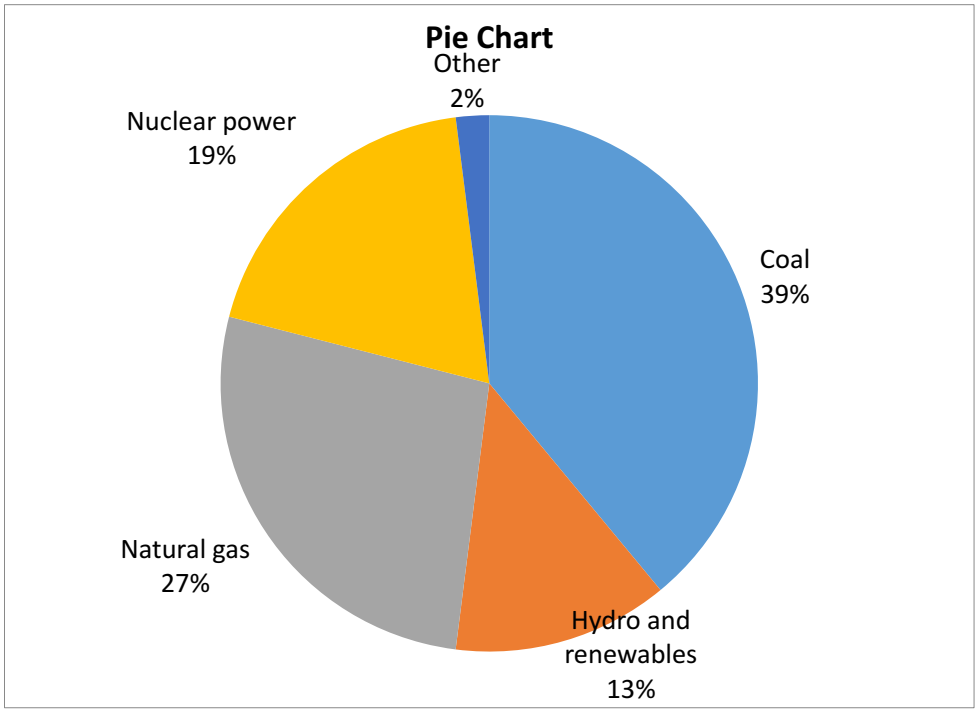
(c) From the Pareto diagram, it is obvious that slightly around 35% of them use their cell phones for social media, texting.

2.26 (a)



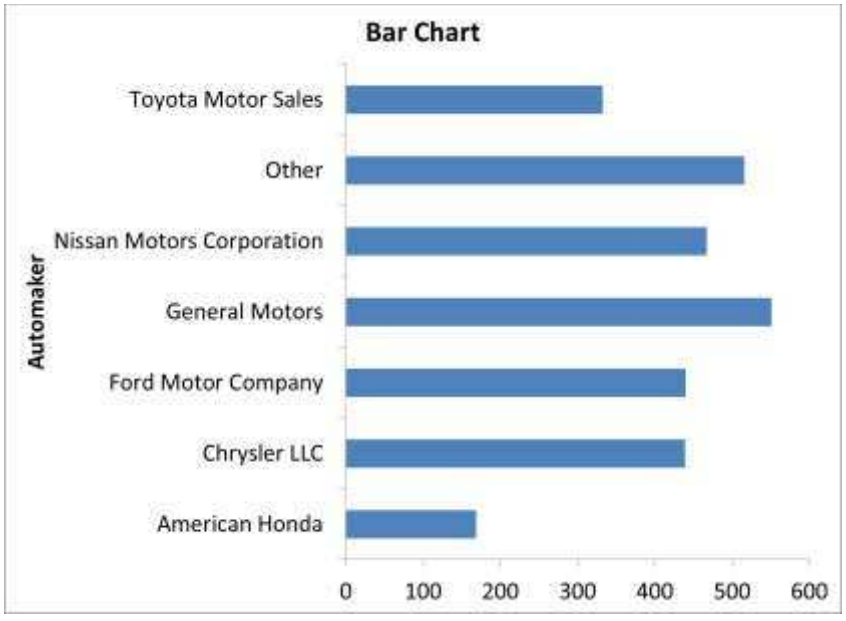
2.26 cont. (b) Eighty-five percent of power is derived from coal, natural gas, or nuclear power.

(c)

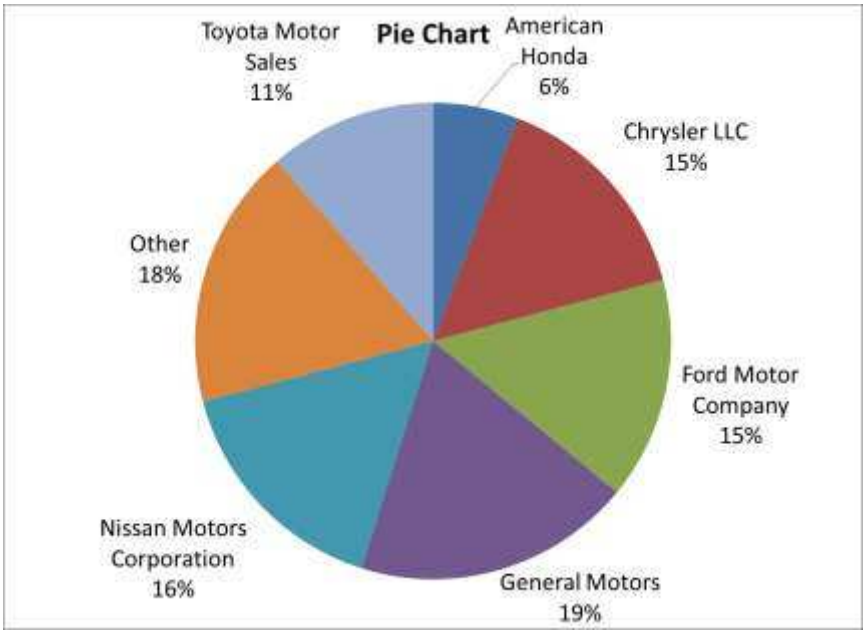


(d) The Pareto diagram is better than the pie chart because it not only sorts the frequencies in descending order, it also provides the cumulative polygon on the same scale.

2.27 (a)



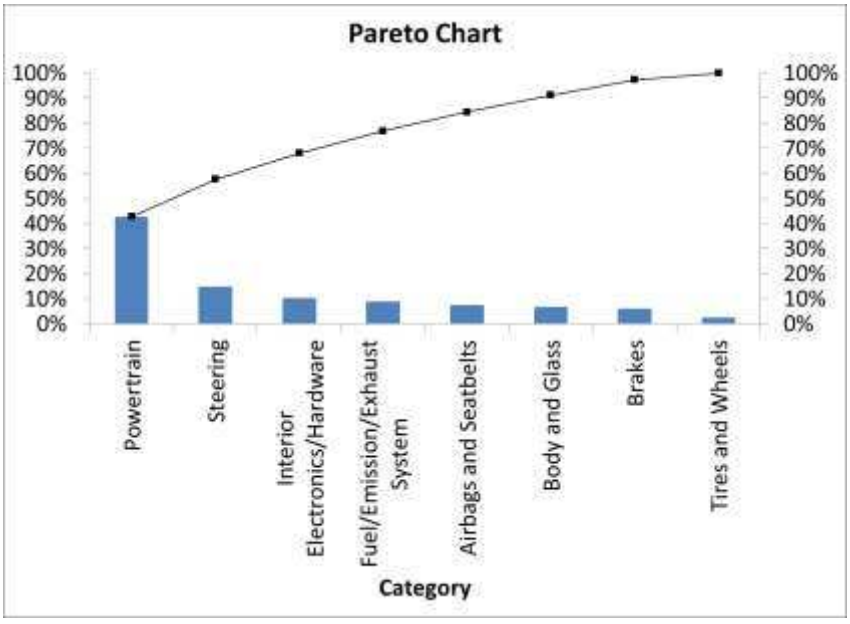
2.27 cont. (a)



(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. *

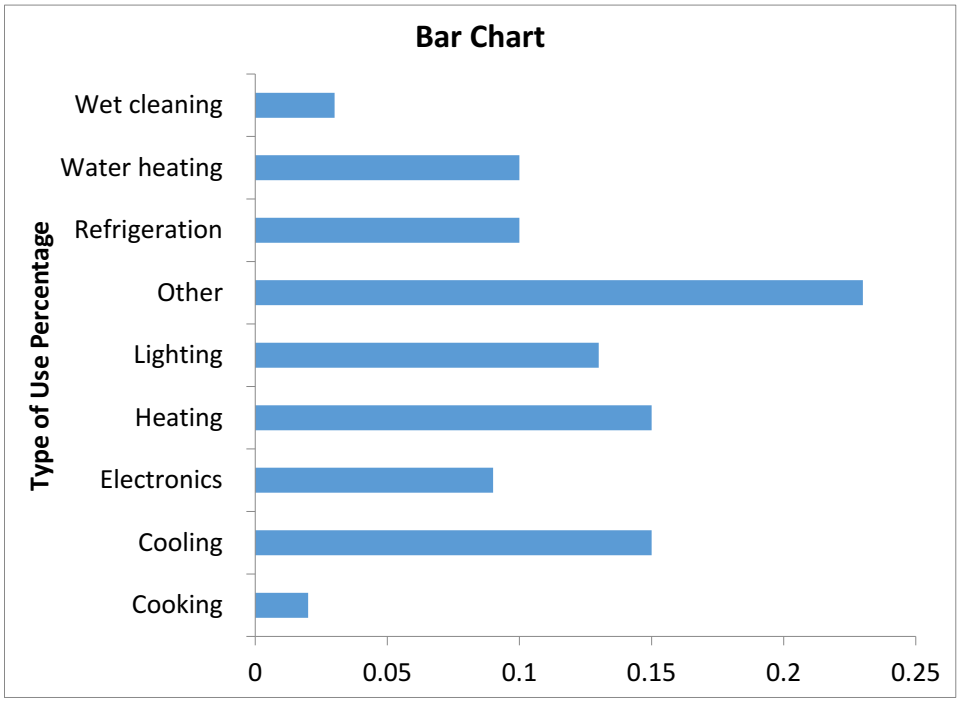
* Note: This is one of the many possible solutions for the question.

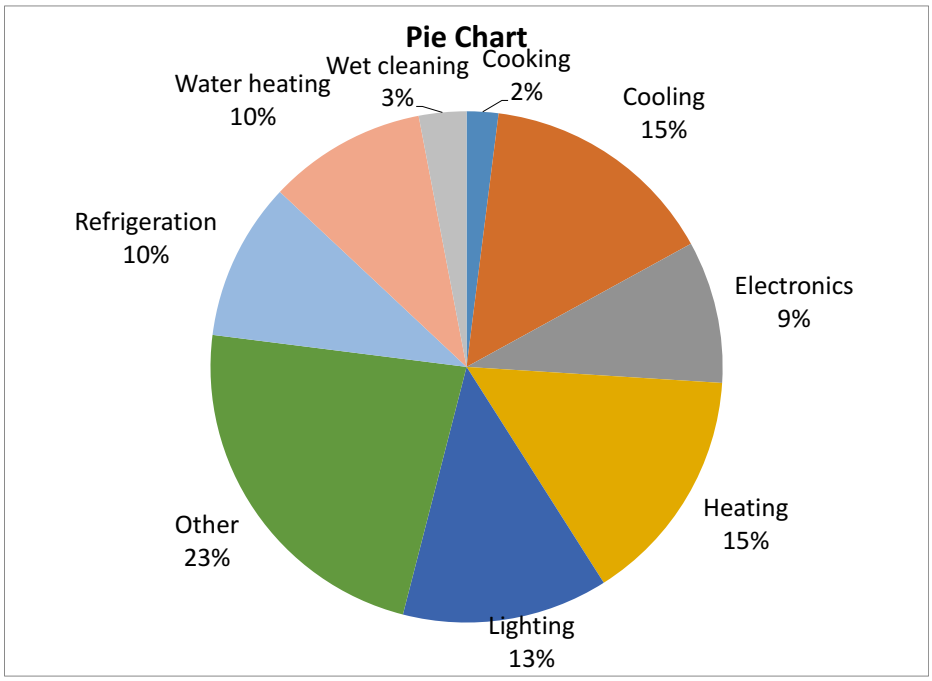
(c)



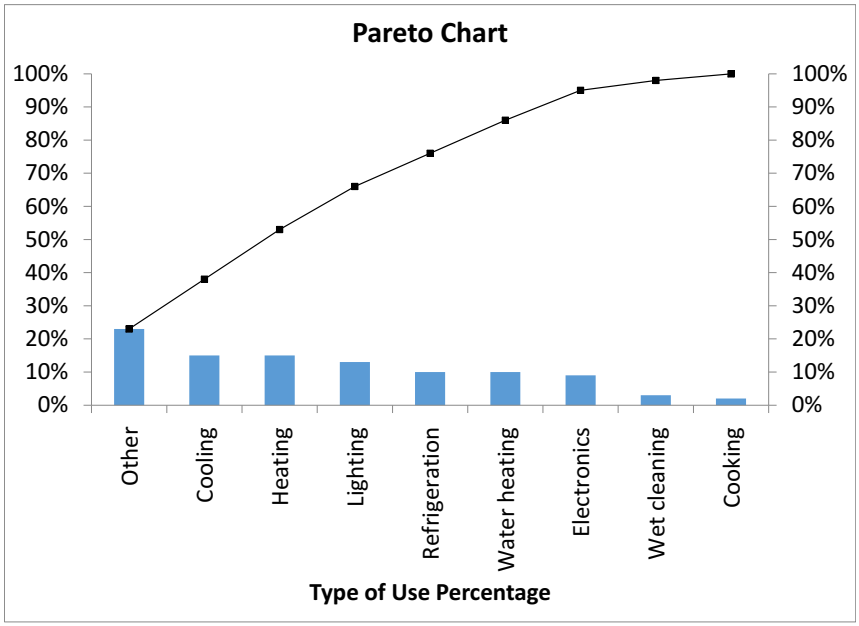
(d) The "vital few" reasons for the categories of complaints are "powertrain", "steering", and "interior electronics/hardware" which account for more than 68% of the complaints. The remaining reasons are the "trivial many" which make up less than 32% of the complaints.

2.28 (a)


Bar Chart
Type of Use Percentage
Wet cleaning
Water heating
Refrigeration
Other
Lighting
Heating
Electronics
Cooling
Cooking
0
0.05
0.1
0.15
0.2
0.25


Pie Chart
Cooking 2%
Wet cleaning 3%
Water heating 10%
Cooling 15%
Refrigeration 10%
Electronics 9%
Heating 15%
Other 23%
Lighting 13%

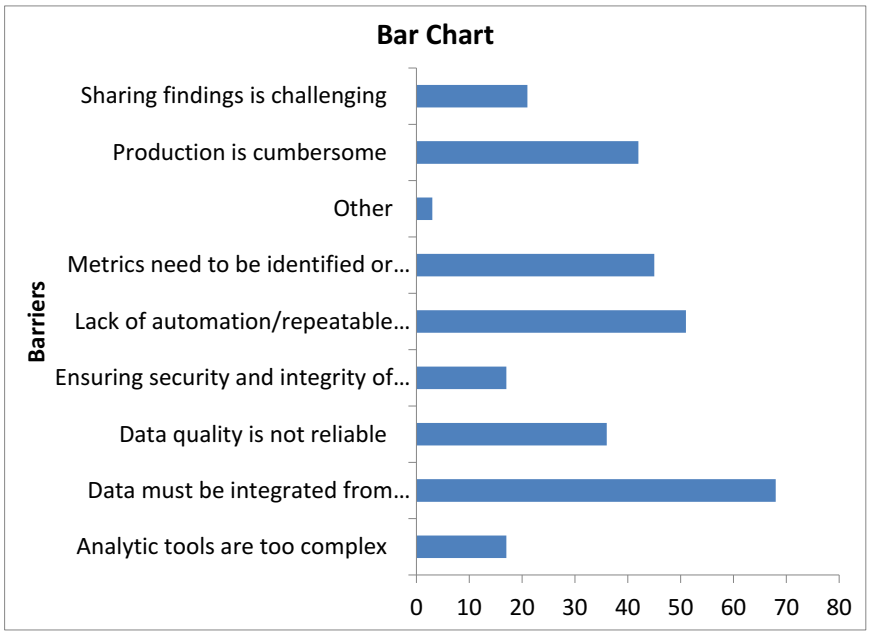
2.28 cont. (a)



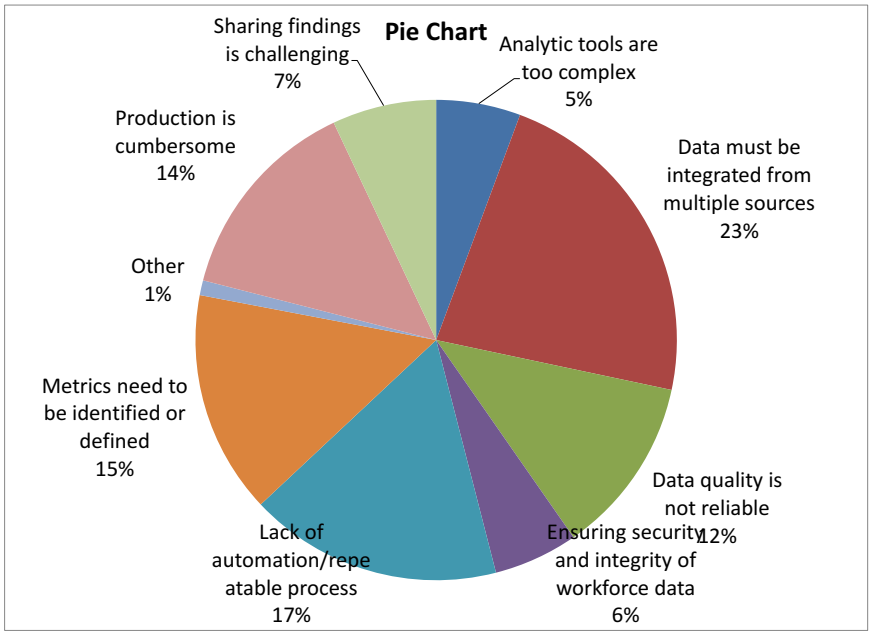
(b) The Pareto diagram is better than the pie chart and bar chart because it not only sorts the frequencies in descending order; it also provides the cumulative polygon on the same scale.

(c) Other, cooling, heating and lighting accounted for 66% of the residential electricity consumption in the United States.

2.29 (a)



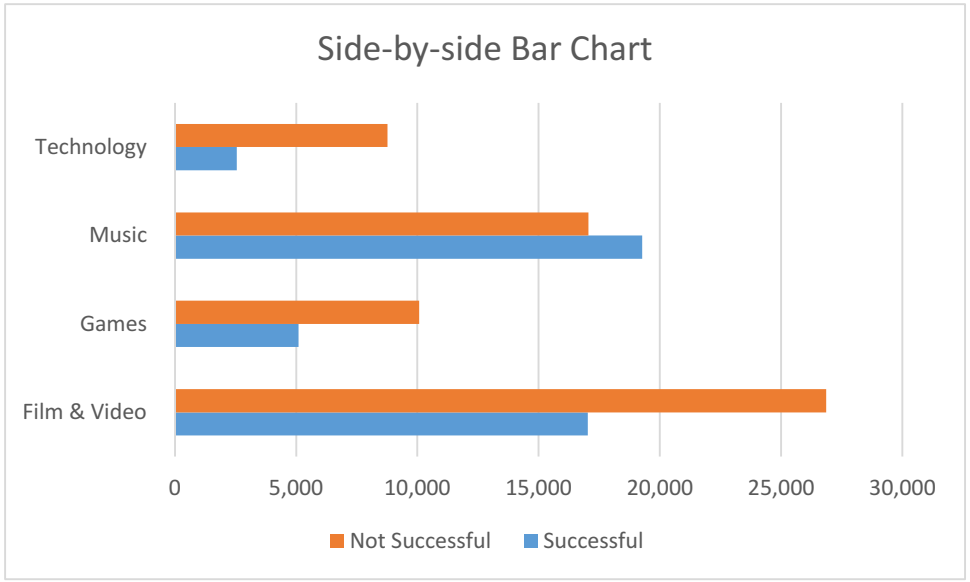
2.29 cont. (a)



(b) The highest percentage of technical barriers to workforce analytics is "data must be integrated from multiple sources" at 23% followed by "lack of automation/repeatable process" at 17%, "metrics need to be identified or defined" at 15% and "production is cumbersome" at 14%.

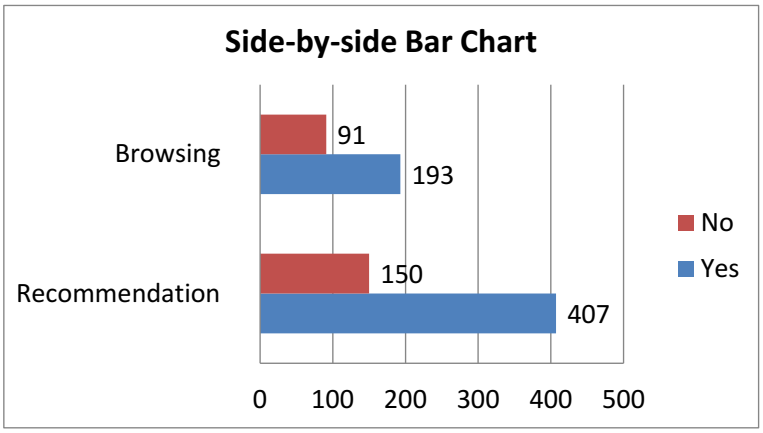
2.30 Whether you are a corporate affairs officer at the company or one of the pension fund managers seeking to ensure an independent board of directors, you should choose Chart 1 because it provides a more direct visual comparison in composition before and after the reform.

2.31 (a)



(b) Music projects have the highest percentage of success while technology projects have the lowest.

2.32 (a)



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

2.33 Stem-and-leaf of Finance Scores

5	34
6	9
7	4
9	38

2.34 Ordered array: 50 74 74 76 81 89 92

2.35 (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.

2.36 (a)

Statistics	
Sample Size	30
Mean	333.5263
Median	303.8000
Std. Deviation	105.3008
Minimum	212.4000
Maximum	676.4200

Stem-and-Leaf Display

Stem unit 100

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

(b) The costs are concentrated around $200 and $370.

2.37 (a) Ordered array:

Minimum Order for Free Shipping ($)					
	0	25	35	45	50
	75	99	150	175	195

(b) Stem-and-leaf plot

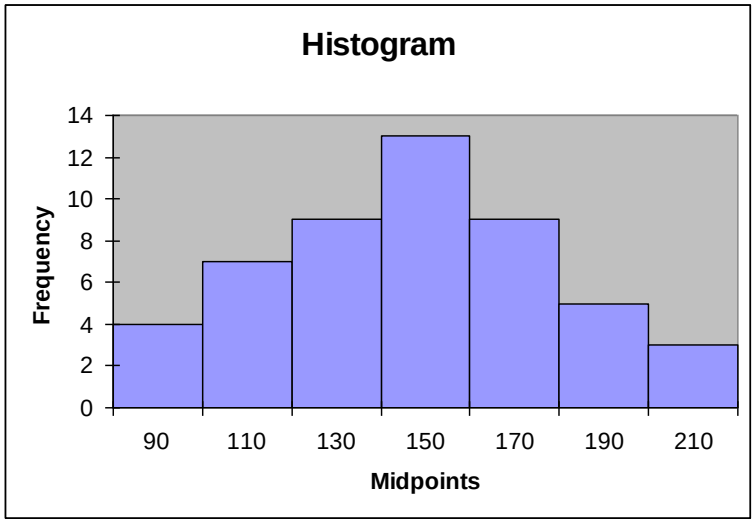
Statistics	
Sample Size	10
Mean	84.9000
Median	62.5000
Std. Deviation	67.3885
Minimum	0.0000
Maximum	195.0000

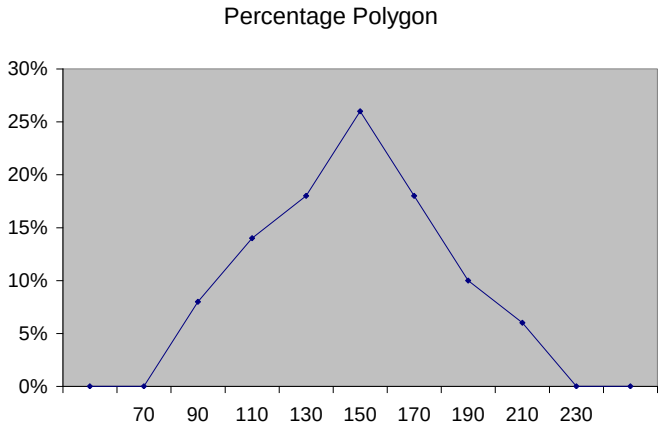
0	0
1	
2	5
3	5
4	5
5	0
6	
7	5
8	
9	9
10	
11	
12	
13	
14	
15	0
16	
17	5
18	
19	5

(c) The stem-and-leaf display usually 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. However, with just 10 data points, the stem-and-leaf display does not show its relative advantages over the ordered array.

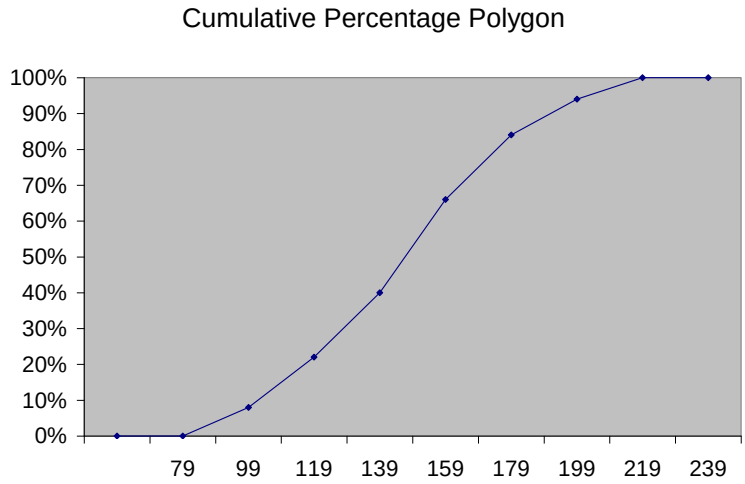
(d) The minimum online order required to receive free shipping is not concentrated around any value.

2.38 (a)





(b)

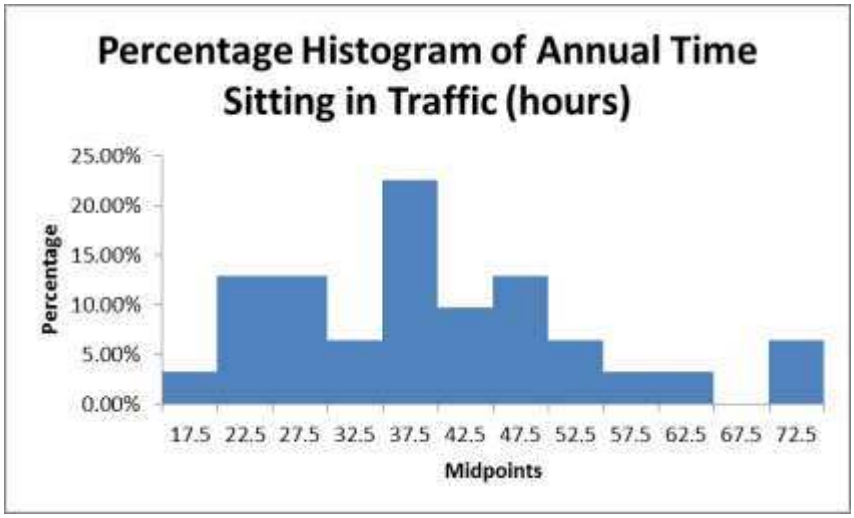


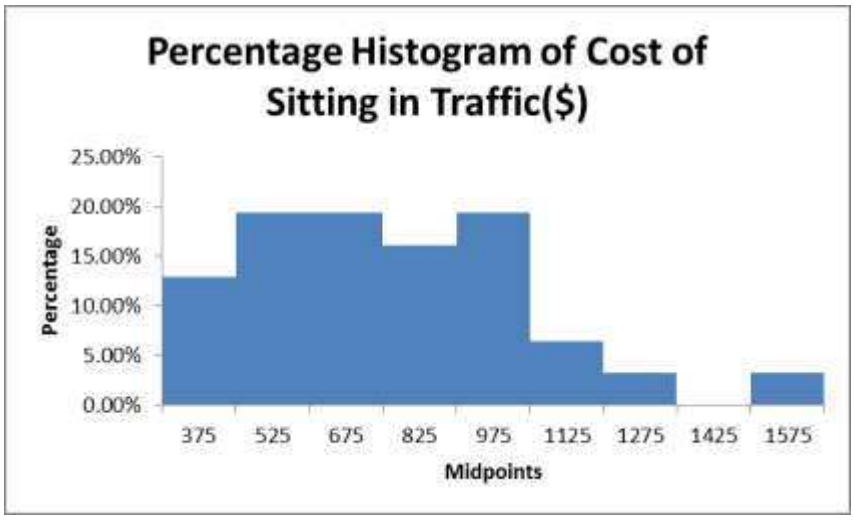
(c) The majority of utility charges are clustered between $120 and $180.

2.39 The costs of attending a baseball game is concentrating between $160 and $240. There are a few outliers in the right tail with two teams having a cost higher than $300.

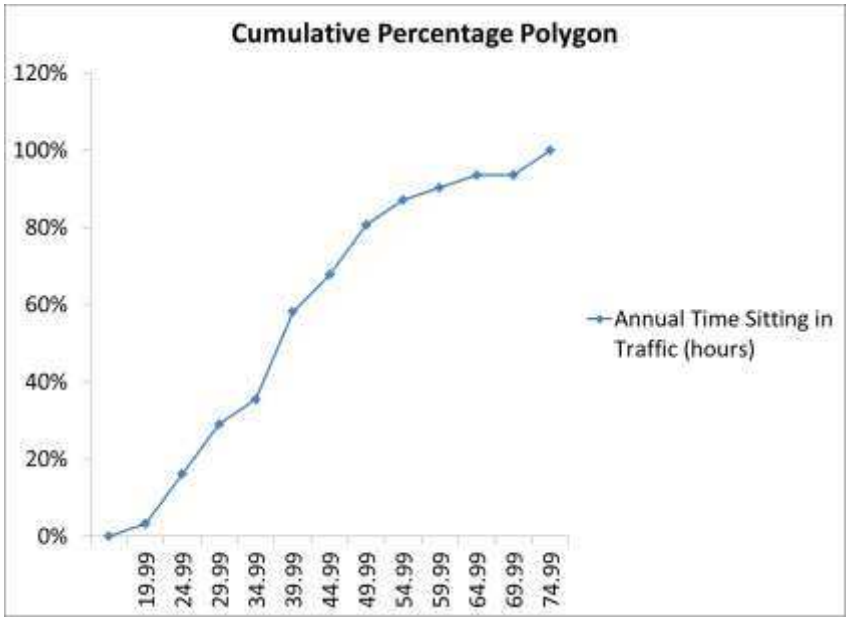
2.40 Property taxes seem concentrated between $1,000 and $1,500 and also between $500 and $1,000 per capita. There were more states with property taxes per capita below $1,500 than above $1,500.

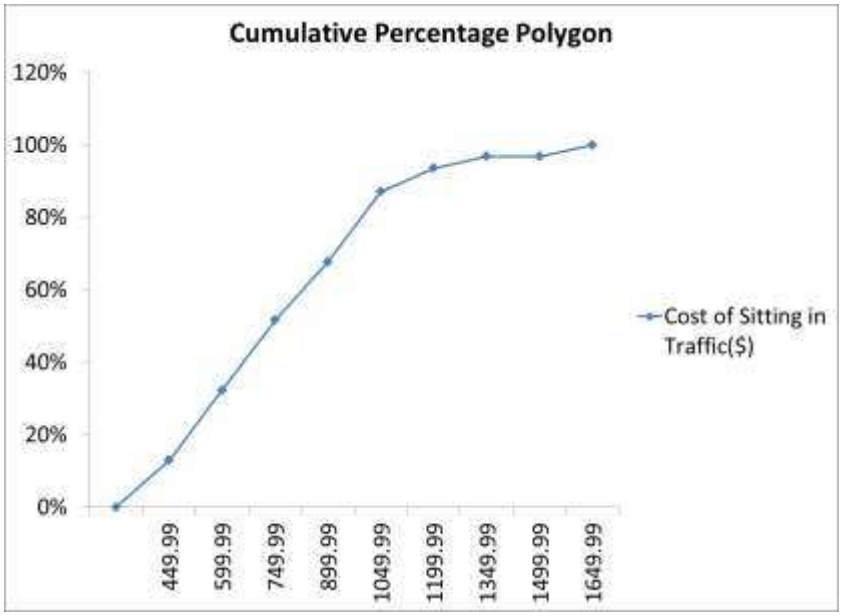
2.41 (a)





2.41 cont. (b)

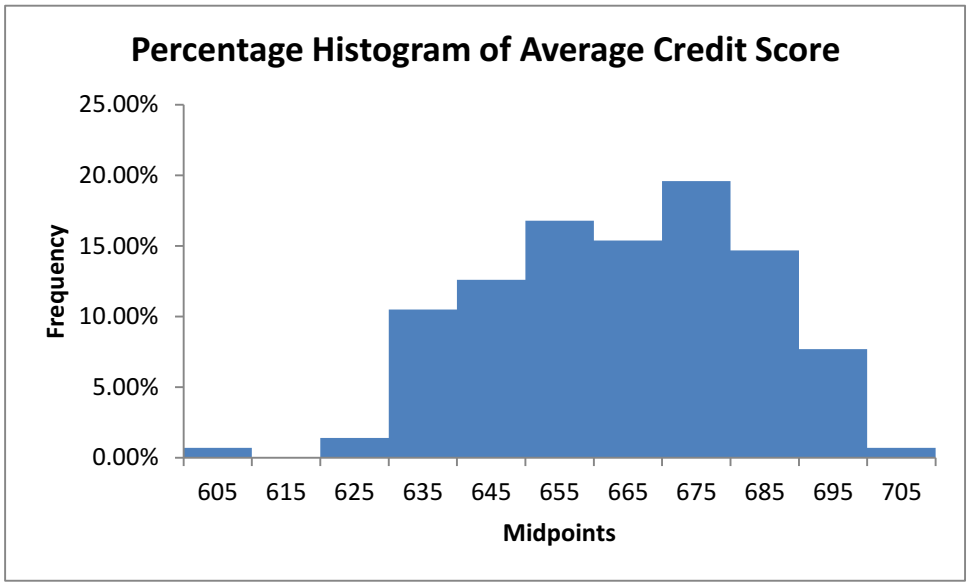




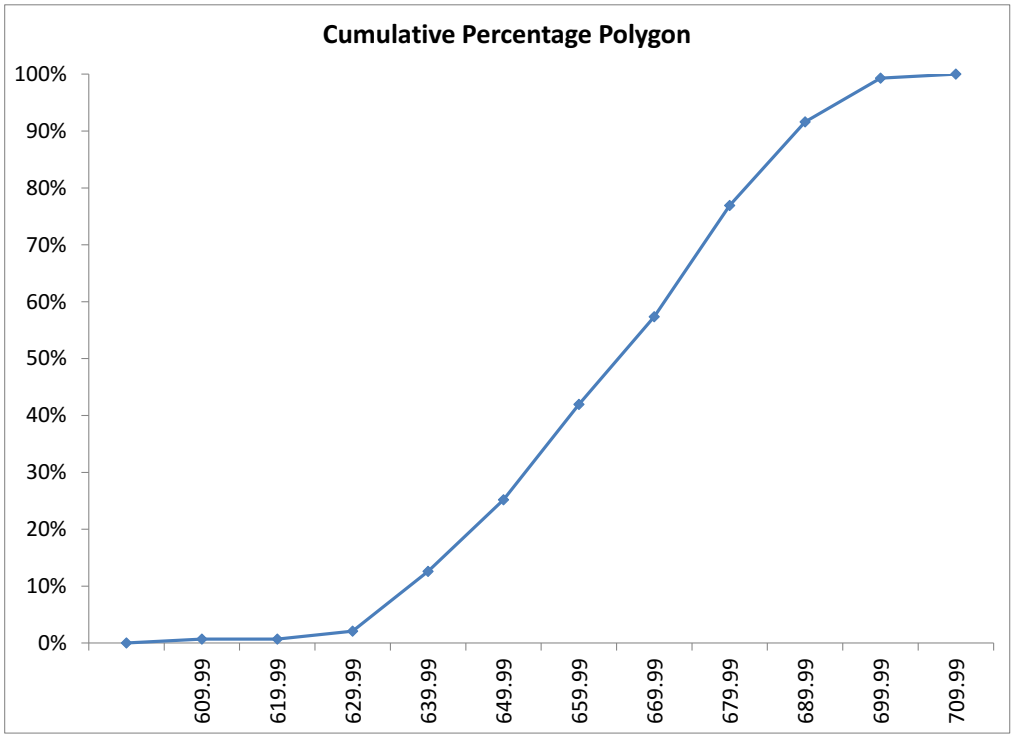
(c) The annual time sitting in traffic is concentrated around 37.5 hours with a few spending as much as around 72.5 hours.

(d) The cost of sitting in traffic per year is concentrated around $675 with one costing as much as $1,575.

2.42 (a)

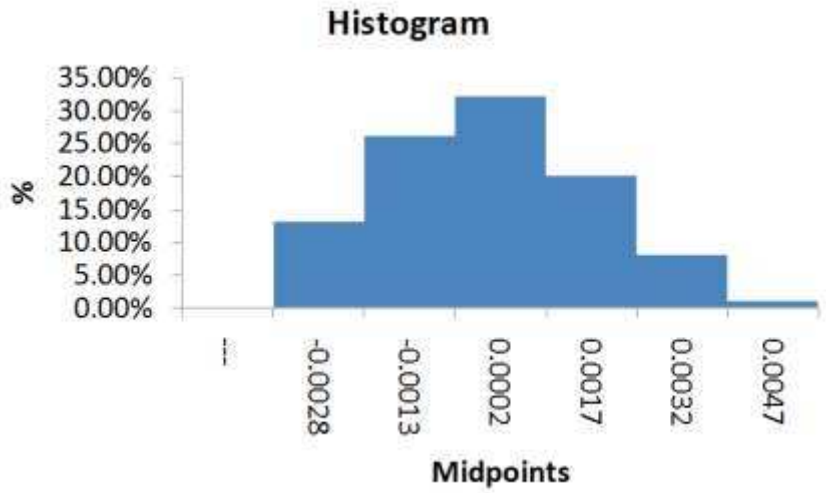


(b)



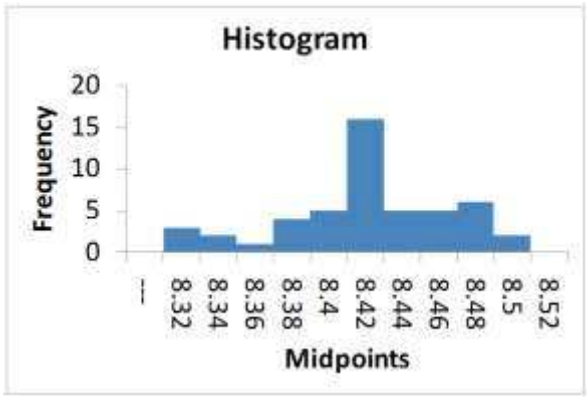
(c) The average credit scores are concentrated between 630 and 690.

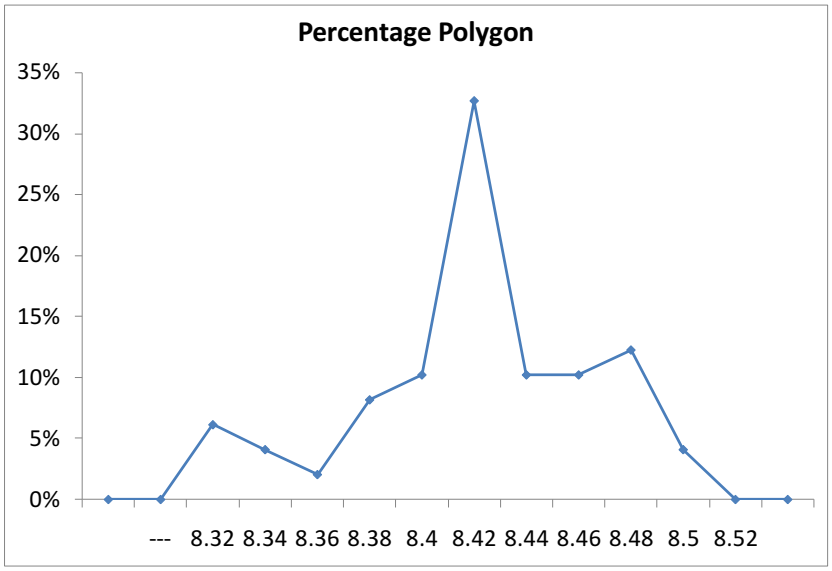
2.43 (a)



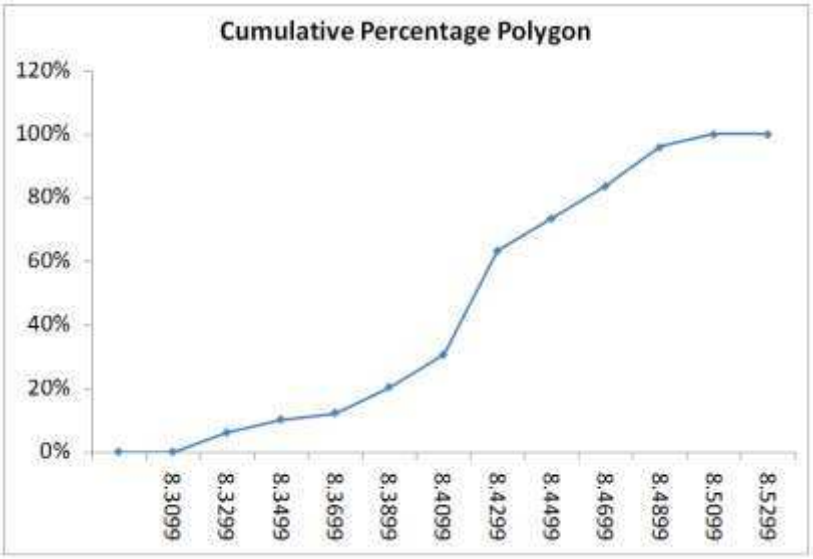
(b) Yes, the steel mill is doing a good job at meeting the requirement as there is only one steel part out of a sample of 100 that is as much as 0.005 inches longer than the specified requirement.

2.44 (a)



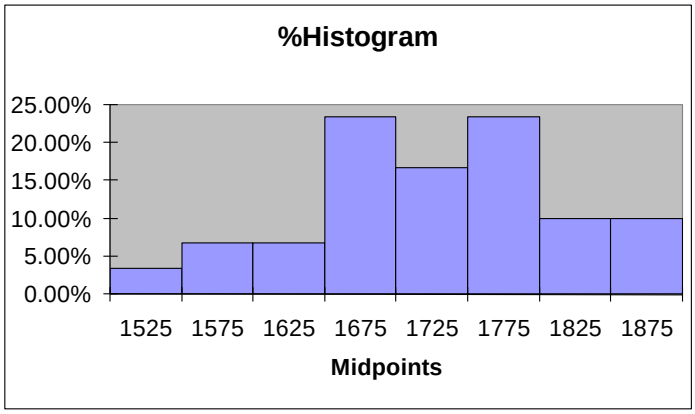


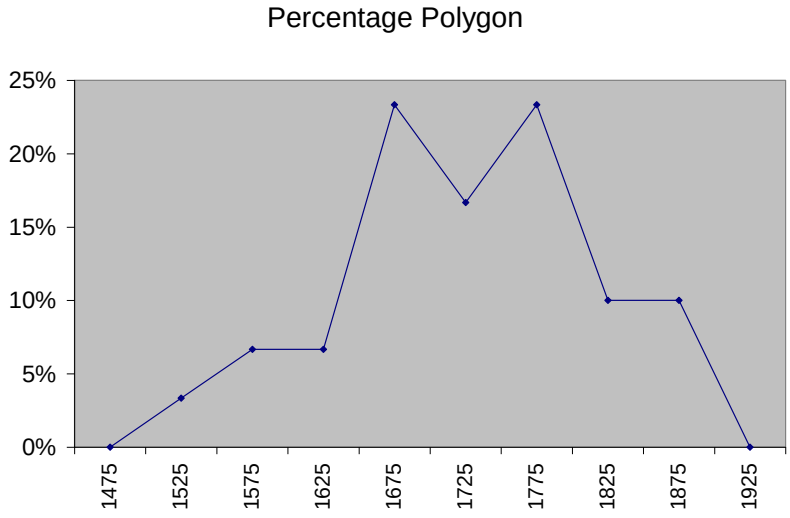
2.44 cont. (b)



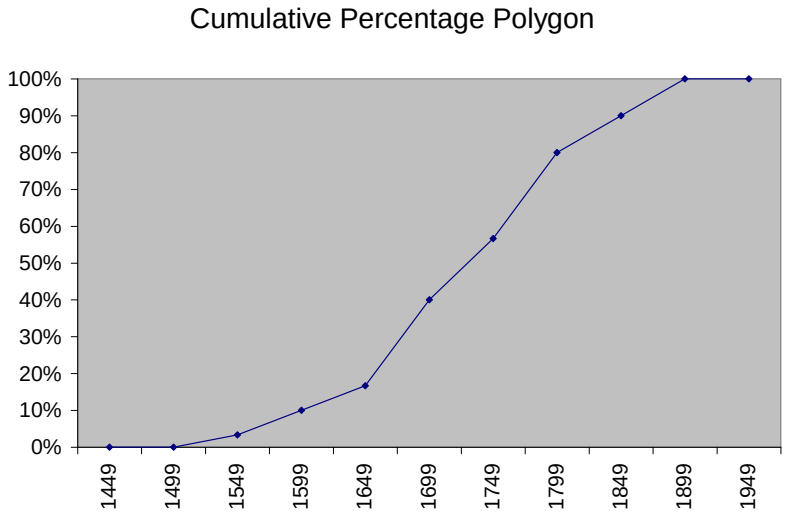
(c) All the troughs will meet the company's requirements of between 8.31 and 8.61 inches wide.

2.45 (a)



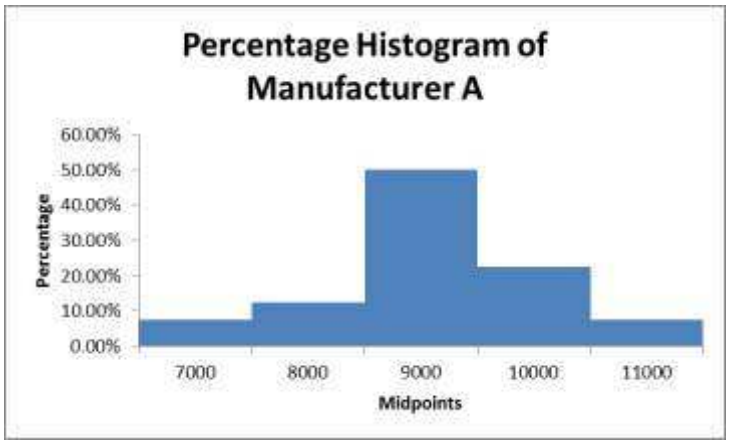


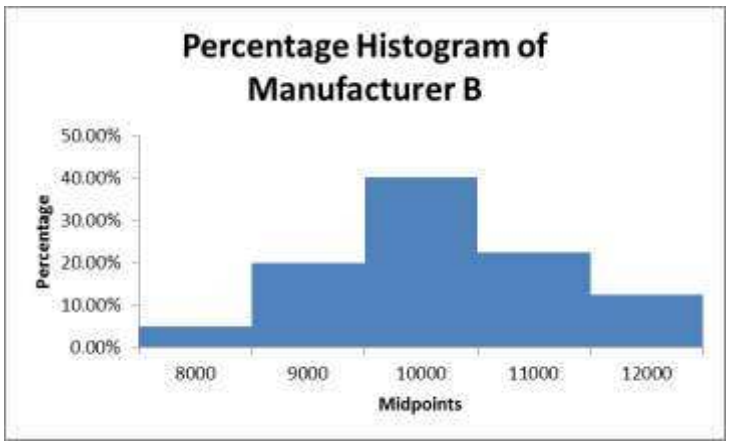
2.45 (b) cont.



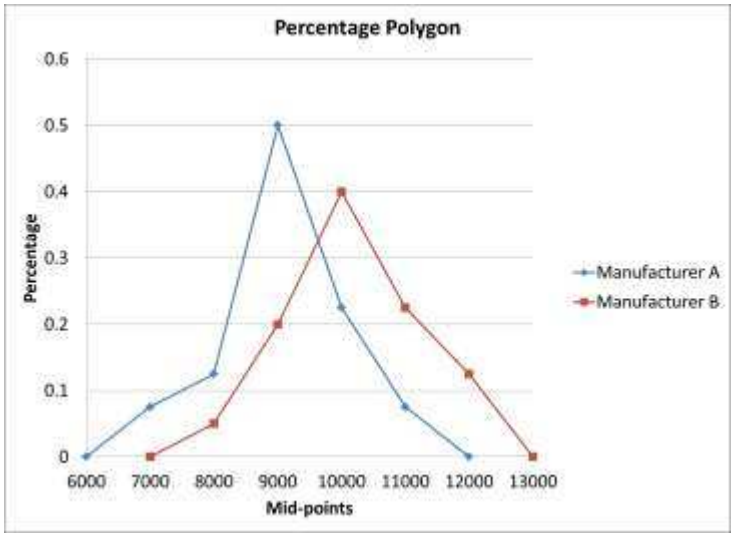
(c) The strength of all the insulators meets the company's requirement of at least 1500 lbs.

2.46 (a)

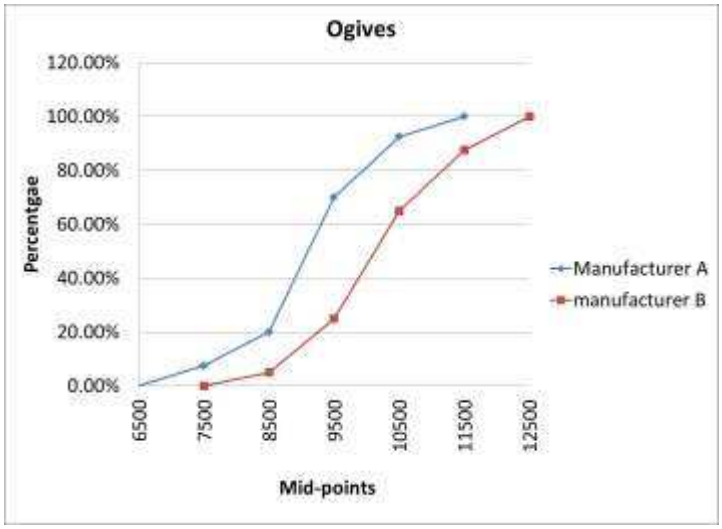




2.46 cont. (a)

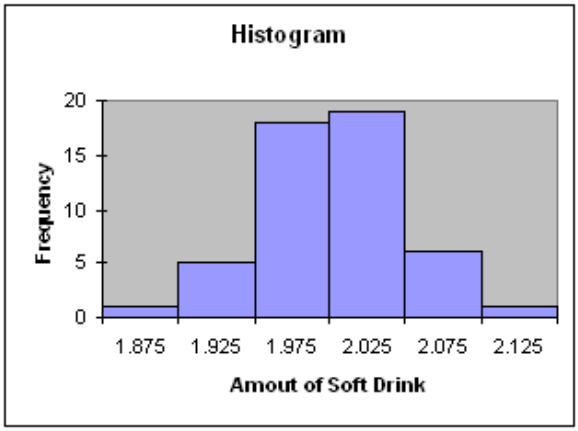


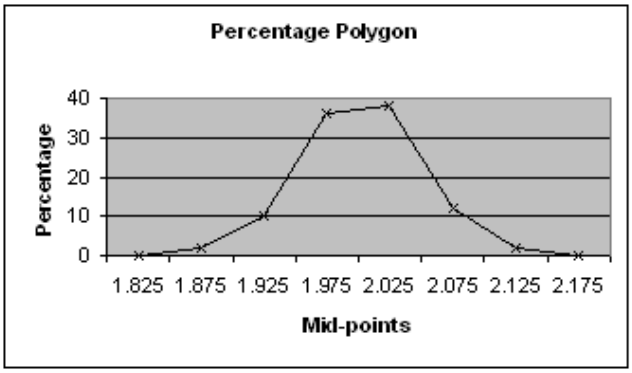
(b)



(c) Manufacturer B produces bulbs with longer lives than Manufacturer A. The cumulative percentage for Manufacturer B shows 65% of their bulbs lasted 10499 hours or less contrasted with 70% of Manufacturer A's bulbs which lasted 9499 hours or less. None of Manufacturer A's bulbs lasted more than 11499 hours, but 12.5% of Manufacturer B's bulbs lasted between 11500 and 12499 hours. At the same time, 7.5% of Manufacturer A's bulbs lasted less than 7500 hours, while all of Manufacturer B's bulbs lasted at least 7500 hours.

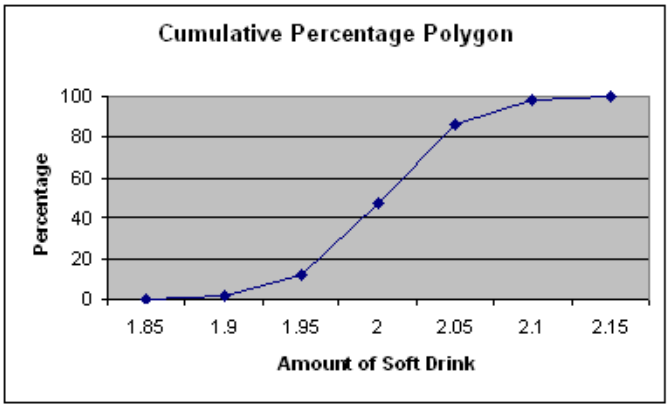
2.47 (a)





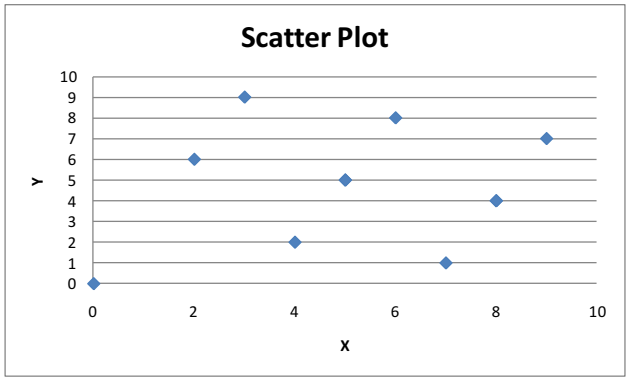
(b)

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



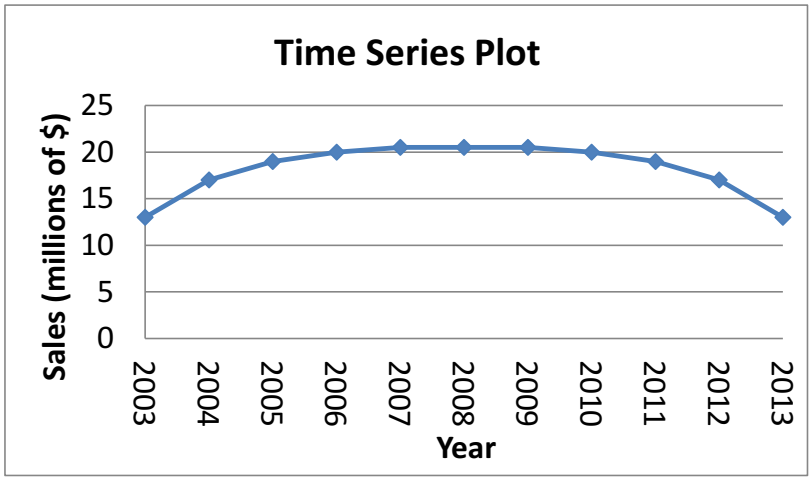
(c) The amount of soft drink filled in the two liter bottles is most concentrated in two intervals on either side of the two-liter mark, from 1.950 to 1.999 and from 2.000 to 2.049 liters. Almost three-fourths of the 50 bottles sampled contained between 1.950 liters and 2.049 liters.

2.48 (a)



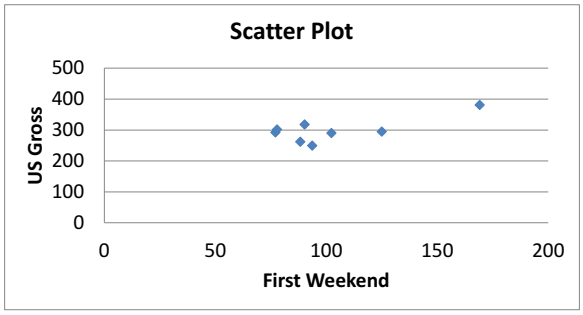
(b) There is no relationship between *X* and *Y*.

2.49 (a)

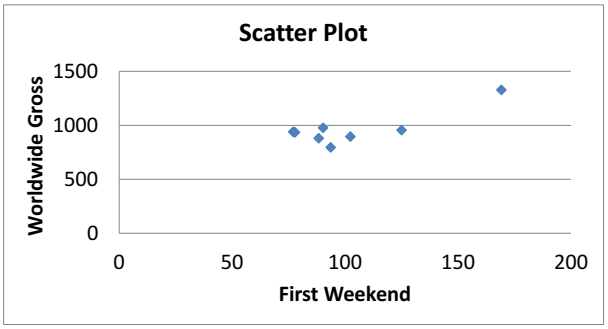


(b) Annual sales appear to be increasing in the earlier years before 2006 but start to decline after 2008.

2.50 (a)

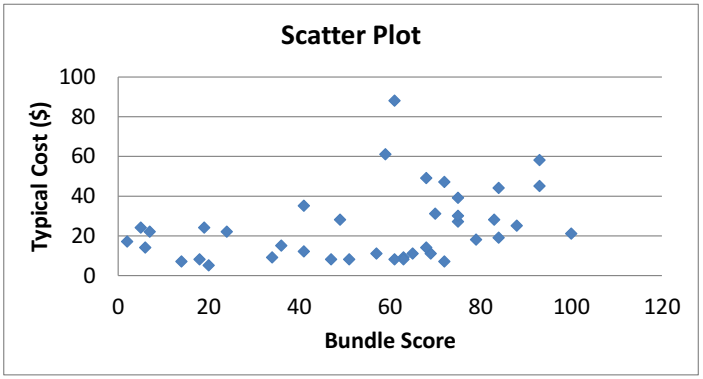


2.50 cont. (b)



(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*.

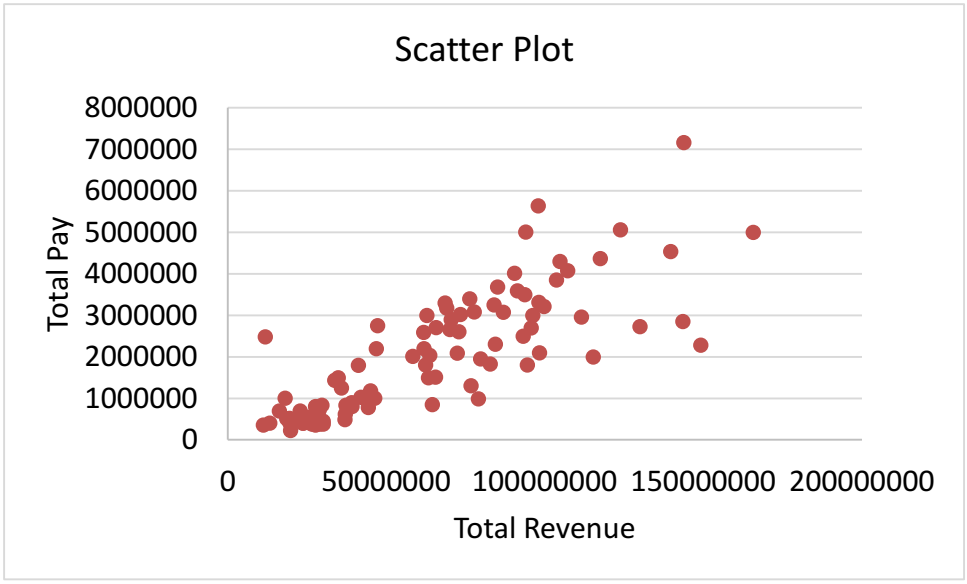
2.51 (a)



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

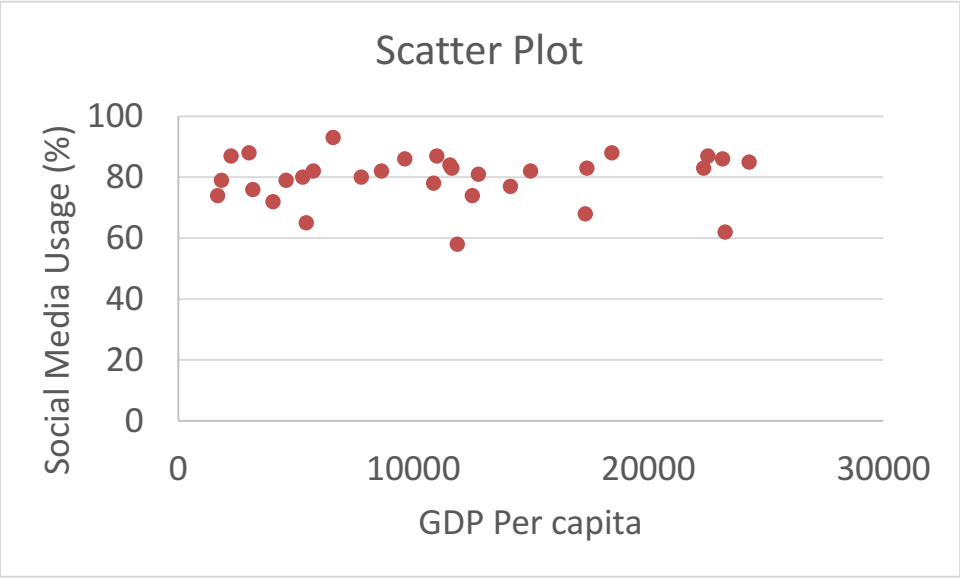
2.52 (a) Yes, schools with higher revenues will also have higher coaches' total pay.

(b)



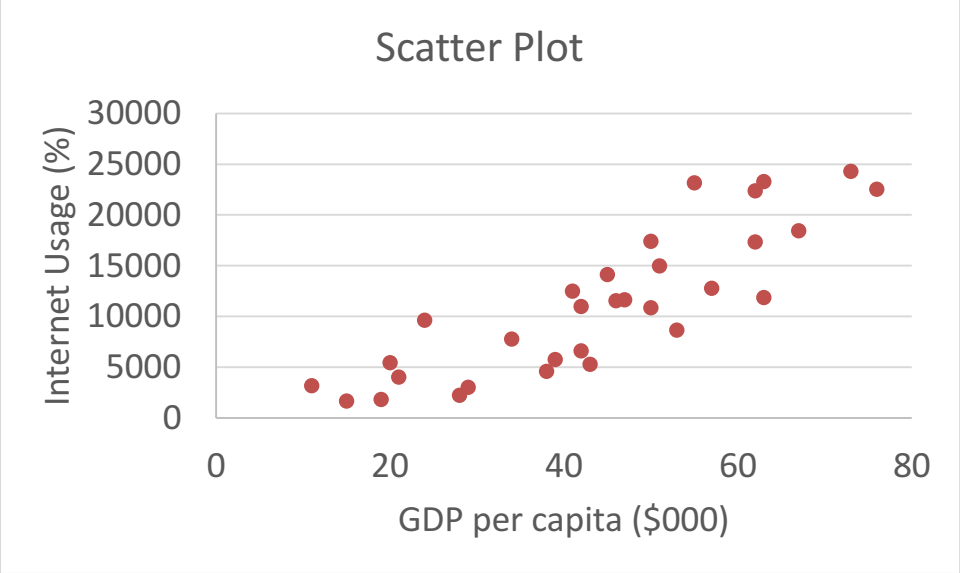
(c) The scatter plot confirms your answer to (a).

2.53 (a)



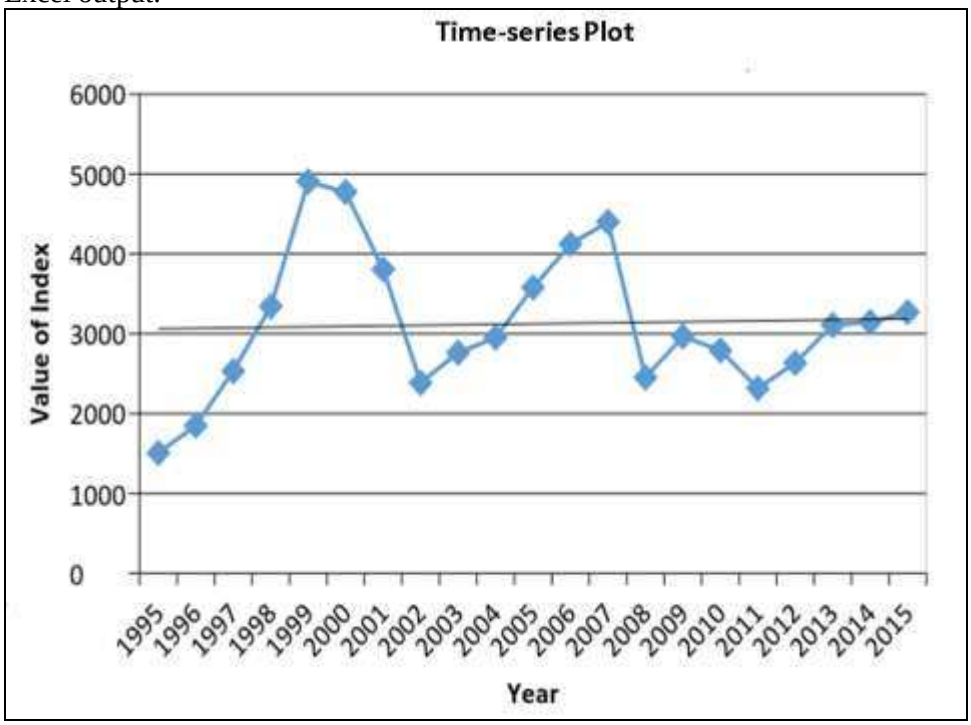
(b) There does not appear to be any relationship between GDP and social media usage.

(c)



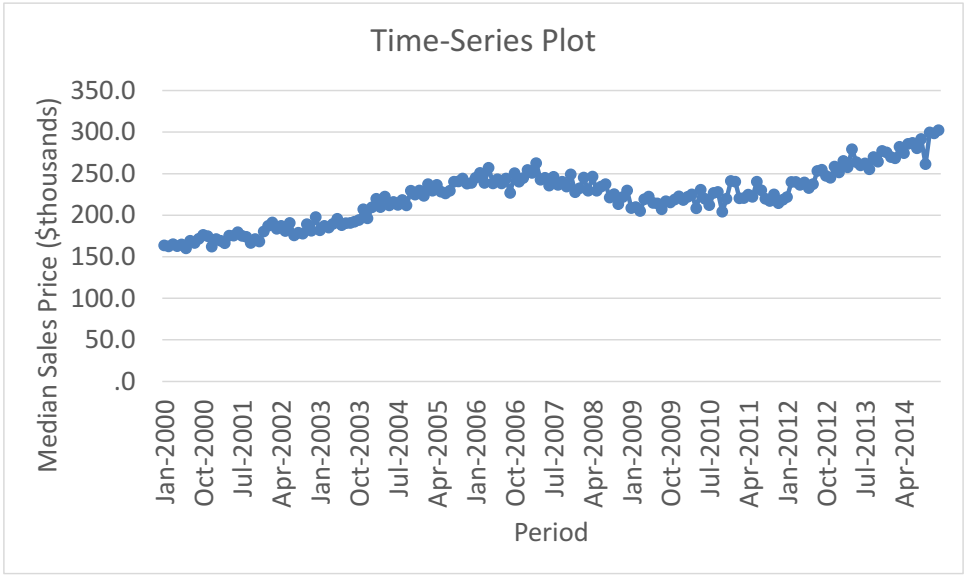
(d) There is a positive relationship between GDP and internet usage.

2.54 (a) Excel output:



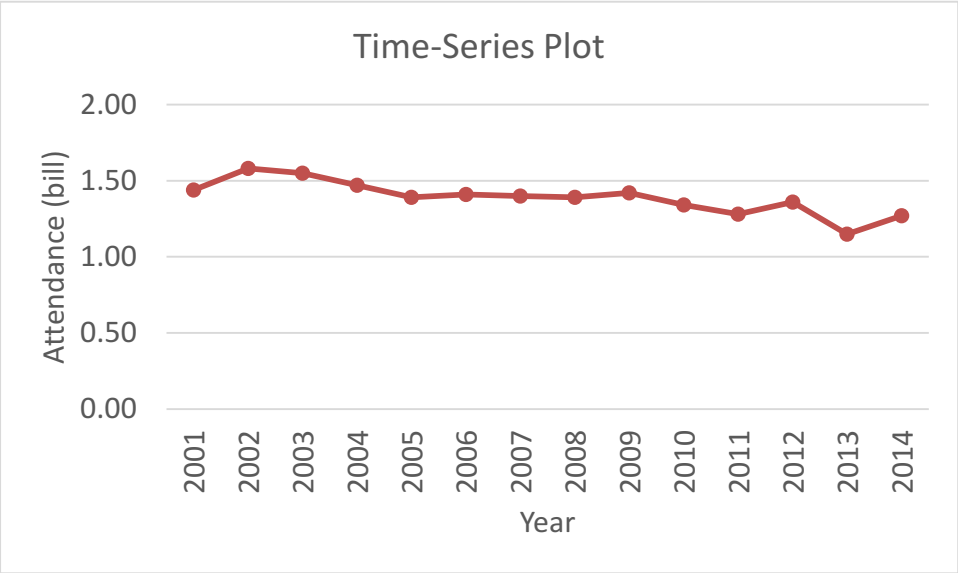
(b) In the period considered, the index fluctuates considerably around a mean value of approximately 3100.

2.55 (a)



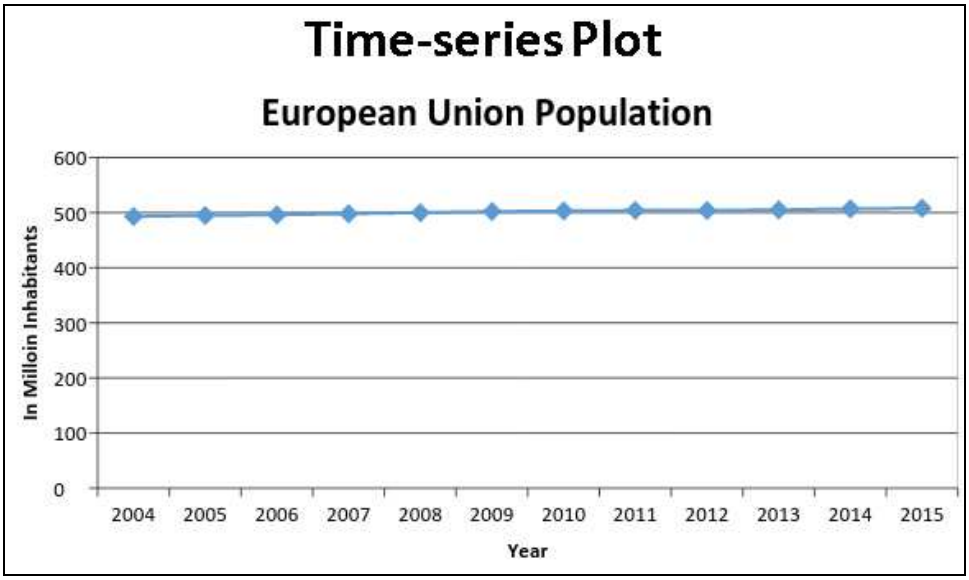
(b) There is an upward trend on the median home sales price till 2007 and the sales price started a downward trend from then on till 2009 when it started to trend up again.

2.56 (a)

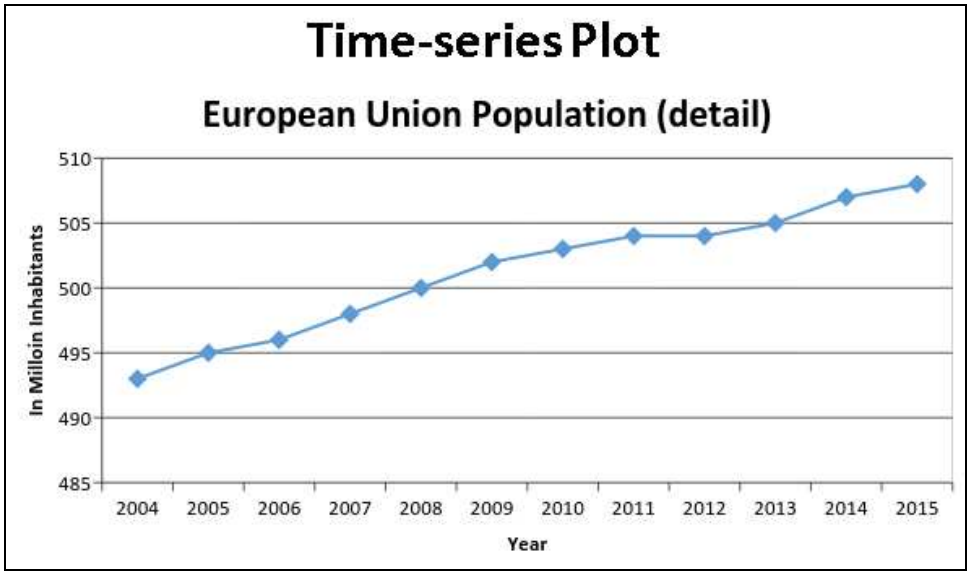


(b) There was a slight decline in movie attendance between 2001 and 2014. During that time, movie attendance increased from 2001 to 2002 but then after 2004 began decreasing to levels below that in 2001.

2.57 (a)



2.57 cont. (a)



(b) In the time period considered, the total population of the European Union was approximately 500 million inhabitants. Comparing the number of inhabitants from 2005 and from 2015, there was a growth of approximately 3.0% only in 11 years, i.e., an average growth of approximately 0.27% per year.

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

Count of 3YrReturn%	Column Labels					
Row Labels	Five	Four	One	Three	Two	Grand Total
Growth	**9**	**45**	**19**	**118**	**78**	**269**
Large	7	21	9	56	34	127
Mid-Cap	1	17	6	39	26	89
Small	1	7	4	23	18	53
Value	**2**	**27**	**9**	**60**	**40**	**138**
Large	1	16	5	39	22	83
Mid-Cap	1	6	3	10	10	30
Small		5	1	11	8	25
Grand Total	**11**	**72**	**28**	**178**	**118**	**407**

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

Count of 3YrReturn%	Column Labels					
Row Labels	Five	Four	One	Three	Two	Grand Total
Growth	**2.21%**	**11.06%**	**4.67%**	**28.99%**	**19.16%**	**66.09%**
Large	1.72%	5.16%	2.21%	13.76%	8.35%	31.20%
Mid-Cap	0.25%	4.18%	1.47%	9.58%	6.39%	21.87%
Small	0.25%	1.72%	0.98%	5.65%	4.42%	13.02%
Value	**0.49%**	**6.63%**	**2.21%**	**14.74%**	**9.83%**	**33.91%**
Large	0.25%	3.93%	1.23%	9.58%	5.41%	20.39%
Mid-Cap	0.25%	1.47%	0.74%	2.46%	2.46%	7.37%
Small	0.00%	1.23%	0.25%	2.70%	1.97%	6.14%
Grand Total	**2.70%**	**17.69%**	**6.88%**	**43.73%**	**28.99%**	**100.00%**

(b) Patterns of star rating conditioned on market cap:
For the growth funds as a group, most are rated as three-star, followed by two-star, four-star, one-star and five-star. The pattern of star rating is similar across the different market cap within the growth funds.
For the value funds as a group, most are rated as three-star, followed by two-star, four-star, one-star and five-star. Within the value funds, the large-cap and small-cap funds follow the same pattern as the value funds as a group. Most of the mid-cap funds are rated as three-star and two-star, followed by four-star, one-star and five-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 four-star, three-star, two-star and one-start growth funds but among the five-star growth funds, most are large-cap, followed by equal portions of small-cap and mid-cap.
The largest share of the value funds is large-cap, followed by mid-cap and small-cap. The pattern is similar among the four-star, three-star, two-star and one-star value funds. Among the five-star value funds, there are equal portions of mid-cap and large-cap with no small-cap funds.

2.58 cont. (c) The average three-year return for each type, market cap, and rating.

Average of 3YrReturn%	Column Labels					
Row Labels	**Five**	**Four**	**One**	**Three**	**Two**	**Grand Total**
Growth	**19.1144**	**17.0080**	**12.0311**	**15.4837**	**13.8681**	**15.1478**
Large	19.3957	17.9414	13.4389	16.3645	15.0629	16.2365
Mid-Cap	18.1000	16.1865	11.1133	14.7990	13.5696	14.4935
Small	18.1600	16.2029	10.2400	14.5004	12.0422	13.6379
Value	**19.4600**	**16.7463**	**9.9322**	**15.5308**	**14.4315**	**15.1418**
Large	17.3200	16.7813	8.7980	15.1287	14.8109	15.0081
Mid-Cap	21.6000	18.8950	10.9767	18.8030	15.3200	16.9710
Small		14.0560	12.4700	13.9818	12.2775	13.3908
Grand Total	**19.1773**	**16.9099**	**11.3564**	**15.4996**	**14.0591**	**15.1458**

(d) There are 56 large cap growth funds with a rating of three. Below are the summary statistics for the three-year return:

	Assets	*Turnover Ratio(%)*	*SD*	*Sharpe Ratio*	*Expense Ratio*	*1YrReturn%*	*3YrReturn%*	*5YrReturn%*	*10YrReturn%*
Mean	1569.913393	55.77178571	10.76696	1.483928571	1.086785714	11.01410714	16.36446429	14.69053571	7.881607143
Standard Error	310.8859493	5.770010607	0.176072	0.025782153	0.029372338	0.479575961	0.211876728	0.178673034	0.214470017
Median	494.945	45.67	10.59	1.485	1.1	11.52	16.455	14.645	7.59
Mode	#N/A	52	11.88	1.41	0.97	#N/A	17.4	14.59	6.8
Standard Deviation	2326.457418	43.17880562	1.317601	0.192935963	0.21980245	3.588817874	1.585540252	1.337066558	1.604946645
Sample Variance	5412404.116	1864.409255	1.736072	0.037224286	0.048313117	12.87961373	2.51393789	1.787746981	2.575853734
Kurtosis	3.48732685	5.005942351	8.467439	-0.399428532	1.175285073	0.352492297	0.300157815	1.402229633	19.64901039
Skewness	1.996776548	1.890223	2.274308	-0.175188156	0.167532557	-0.476041631	-0.140678531	-0.330129068	3.668370541
Range	9832.5	226.51	7.91	0.81	1.25	18.35	7.63	7.69	11.41
Minimum	28.75	7.49	9.03	1.01	0.53	0.53	12.4	10.43	5.7
Maximum	9861.25	234	16.94	1.82	1.78	18.88	20.03	18.12	17.11
Sum	87915.15	3123.22	602.95	83.1	60.86	616.79	916.41	822.67	441.37
Count	56	56	56	56	56	56	56	56	56

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

Count of 3YrReturn%	Column Labels					
Row Labels	Five	Four	One	Three	Two	Grand Total
Large	**8**	**37**	**14**	**95**	**56**	**210**
Average	7	29	13	72	46	167
High	1	1	1	2	2	7
Low		7		21	8	36
Mid-Cap	**2**	**23**	**9**	**49**	**36**	**119**
Average	1	21	3	46	27	98
High		1	4	2	9	16
Low	1	1	2	1		5
Small	**1**	**12**	**5**	**34**	**26**	**78**
Average	1	5		18	7	31
High		7	5	16	19	47
Grand Total	**11**	**72**	**28**	**178**	**118**	**407**

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

Count of 3YrReturn%	Column Labels					
Row Labels	Five	Four	One	Three	Two	Grand Total
Large	**1.97%**	**9.09%**	**3.44%**	**23.34%**	**13.76%**	**51.60%**
Average	1.72%	7.13%	3.19%	17.69%	11.30%	41.03%
High	0.25%	0.25%	0.25%	0.49%	0.49%	1.72%
Low	0.00%	1.72%	0.00%	5.16%	1.97%	8.85%
Mid-Cap	**0.49%**	**5.65%**	**2.21%**	**12.04%**	**8.85%**	**29.24%**
Average	0.25%	5.16%	0.74%	11.30%	6.63%	24.08%
High	0.00%	0.25%	0.98%	0.49%	2.21%	3.93%
Low	0.25%	0.25%	0.49%	0.25%	0.00%	1.23%
Small	**0.25%**	**2.95%**	**1.23%**	**8.35%**	**6.39%**	**19.16%**
Average	0.25%	1.23%	0.00%	4.42%	1.72%	7.62%
High	0.00%	1.72%	1.23%	3.93%	4.67%	11.55%
Grand Total	**2.70%**	**17.69%**	**6.88%**	**43.73%**	**28.99%**	**100.00%**

2.59 cont. (b) Patterns of star rating conditioned on risk:

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

For the mid-cap funds as a group, most are rated as four-star, followed by three-star, two-star, five-star and then one-star. The pattern of star rating is different among the average-risk mid-cap funds with the largest portion of two-star, followed by three-star, four-star, one-star and five-star. Among the low-risk mid-cap funds, most are rated as four-star, followed by three-star, five-star, two-star and one-star.

For the small-cap funds as a group, most are rated as three-star, followed by four-star, two-star, one-star and then five-star. Among the average-risk small-cap funds, most are three-star, followed by two-star, four-star, one-star and five-star. Among the high-risk small-cap funds, most are rated as one-star, followed by equal portions of two-star, three-star and four-star and no five-star. Among the low-risk small-cap funds, most are four-star, followed by three-star and equal portions of two-star and five-star with none rated as 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 one-star, two-star, three-star, four-star and five-star large-cap funds. Among the mid-cap funds, most are low-risk, followed by average-risk with no high-risk. The pattern is the same among the five-star, four-star and three-star mid-cap funds.

Among the small-cap funds, most are average-risk, followed by low-risk and finally high-risk. The pattern is the same for the two-star and three-star small-cap funds. Among the one-star small-cap funds, most are high-risk, followed by average-risk with no low-risk. Among the four-star and five-star small-cap funds, most are low-risk, followed by average-risk and high-risk.

(c) The average three-year return for each market cap, risk, and rating.

Average of 3YrReturn%	Column Labels					
Row Labels	Five	Four	One	Three	Two	Grand Total
Large	**19.1363**	**17.4397**	**11.7814**	**15.8572**	**14.9639**	**15.7510**
Average	18.8986	17.8693	12.5423	16.2635	15.3628	16.1150
High	20.8000	19.0200	1.8900	16.7050	16.1700	15.3514
Low		15.4343		14.3833	12.3688	14.1400
Mid-Cap	**19.8500**	**16.8930**	**11.0678**	**15.6161**	**14.0558**	**15.1181**
Average	21.6000	16.5819	10.6400	15.6330	14.1159	15.3264
High		21.4100	9.7925	15.0500	13.8756	13.4725
Low	18.1000	18.9100	14.2600	15.9700		16.3000
Small	**18.1600**	**15.3083**	**10.6860**	**14.3326**	**12.1146**	**13.5587**
Average	18.1600	14.5280		14.1700	10.5371	13.5361
High		15.8657	10.6860	14.5156	12.6958	13.5736
Grand Total	**19.1773**	**16.9099**	**11.3564**	**15.4996**	**14.0591**	**15.1458**

2.59 (d) cont. There are 2 large cap funds that are high risk with a rating of three. Below are the summary statistics for the three-year return:

	Assets	*Turnover Ratio(%)*	*SD*	*Sharpe Ratio*	*1YrReturn%*	*3YrReturn%*	*5YrReturn%*	*10YrReturn%*	*Expense Ratio*
Mean	201.675	44	15.725	1.09	1.715	16.705	16.09	10.315	1.285
Standard Error	165.705	5	1.215	0.08	1.185	0.525	0.93	0.815	0.015
Median	201.675	44	15.725	1.09	1.715	16.705	16.09	10.315	1.285
Mode	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
Standard Deviation	234.3422584	7.071067812	1.718269478	0.113137085	1.675843071	0.74246212	1.315218613	1.152584053	0.021213203
Sample Variance	54916.29405	50	2.95245	0.0128	2.80845	0.55125	1.7298	1.32845	0.00045
Kurtosis	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Skewness	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Range	331.41	10	2.43	0.16	2.37	1.05	1.86	1.63	0.03
Minimum	35.97	39	14.51	1.01	0.53	16.18	15.16	9.5	1.27
Maximum	367.38	49	16.94	1.17	2.9	17.23	17.02	11.13	1.3
Sum	403.35	88	31.45	2.18	3.43	33.41	32.18	20.63	2.57
Count	2	2	2	2	2	2	2	2	2

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

Count of 3YrReturn%	**Column Labels**					
Row Labels	**Five**	**Four**	**One**	**Three**	**Two**	**Grand Total**
Growth	**9**	**45**	**19**	**118**	**78**	**269**
Average	7	35	11	95	51	199
High	1	7	7	16	23	54
Low	1	3	1	7	4	16
Value	**2**	**27**	**9**	**60**	**40**	**138**
Average	2	20	5	41	29	97
High		2	3	4	7	16
Low		5	1	15	4	25
Grand Total	**11**	**72**	**28**	**178**	**118**	**407**

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

Count of 3YrReturn%	**Column Labels**					
Row Labels	**Five**	**Four**	**One**	**Three**	**Two**	**Grand Total**
Growth	**2.21%**	**11.06%**	**4.67%**	**28.99%**	**19.16%**	**66.09%**
Average	1.72%	8.60%	2.70%	23.34%	12.53%	48.89%
High	0.25%	1.72%	1.72%	3.93%	5.65%	13.27%
Low	0.25%	0.74%	0.25%	1.72%	0.98%	3.93%
Value	**0.49%**	**6.63%**	**2.21%**	**14.74%**	**9.83%**	**33.91%**
Average	0.49%	4.91%	1.23%	10.07%	7.13%	23.83%
High	0.00%	0.49%	0.74%	0.98%	1.72%	3.93%
Low	0.00%	1.23%	0.25%	3.69%	0.98%	6.14%
Grand Total	**2.70%**	**17.69%**	**6.88%**	**43.73%**	**28.99%**	**100.00%**

2.60 cont. (b) Patterns of star rating conditioned on risk:

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

For the value funds as a group, most are rated as three-star, followed by two-star, four-star, one-star and five-star. The average-risk value funds follow the same pattern. Among the high-risk value funds, most are two-star, followed by three-star, one-star, four-star with no five-star. Among the low-risk value funds, most are three-star, followed by four-star, two-star, one-star with no one-star.

Patterns of risk conditioned on star rating:

Most of the growth funds are rated as average-risk, followed by high-risk and then low-risk. The pattern is the same among the one-star, two-star, three-star and four-star growth funds. Among the five-star growth funds, most are average-risk, followed by equal portions of high-risk and low-risk.

Most of the value funds are rated as average-risk, followed by low-risk and then high-risk. The pattern is the same among the three-star and four-star value funds. Among the one-star and two-star value funds, most are average-risk, followed by high-risk and low-risk. Among the five-star value funds, all are average-risk with no low-risk or high-risk.

(c)

Average of 3YrReturn%	Column Labels					
Row Labels	**Five**	**Four**	**One**	**Three**	**Two**	**Grand Total**
Growth	**19.1144**	**17.0080**	**12.0311**	**15.4837**	**13.8681**	**15.1478**
Average	19.0186	16.9457	12.9064	15.6177	14.0775	15.4263
High	20.8000	17.4457	10.3371	14.8094	13.3452	14.0587
Low	18.1000	16.7133	14.2600	15.2071	14.2050	15.3606
Value	**19.4600**	**16.7463**	**9.9322**	**15.5308**	**14.4315**	**15.1418**
Average	19.4600	17.2985	10.6000	16.1334	15.2976	15.9071
High		14.6850	7.3767	14.7025	13.0714	12.6131
Low		15.3620	14.2600	14.1047	10.5325	13.7908
Grand Total	**19.1773**	**16.9099**	**11.3564**	**15.4996**	**14.0591**	**15.1458**

(d) There are 16 growth funds with high risk with a rating of three. Below are the summary statistics for the three-year return:

	Assets	*Turnover Ratio(%)*	*SD*	*Sharpe Ratio*	*1YrReturn%*	*3YrReturn%*	*5YrReturn%*	*10YrReturn%*	*Expense Ratio*
Mean	288.66625	116.2125	14.45625	1.095625	0.1375	14.809375	15.6625	8.463125	1.394375
Standard Error	63.7015223	38.50097604	0.237966866	0.062769212	1.084409786	0.575337197	0.367889816	0.438094091	0.047019223
Median	257.64	77	14.385	1.02	-0.445	13.84	15.375	8.175	1.38
Mode	#N/A	#N/A	#N/A	1.29	#N/A	#N/A	#N/A	#N/A	1.3
Standard Deviation	254.8060892	154.0039042	0.951867463	0.251076847	4.337639143	2.301348789	1.471559264	1.752376363	0.18807689
Sample Variance	64926.14309	23717.2025	0.906051667	0.063039583	18.81511333	5.29620625	2.165486667	3.070822917	0.035372917
Kurtosis	-0.717209396	13.85191441	1.691247726	6.096226271	0.375691283	-0.366090479	-0.601262563	1.716192124	2.579478964
Skewness	0.690555804	3.615932824	1.129564954	2.179561503	0.686588585	0.846169605	-0.128329303	1.265339908	1.016917946
Range	756.93	659	3.62	1.03	16.48	7.58	4.94	6.48	0.8
Minimum	35.97	18	13.32	0.85	-6.51	12.26	13.02	6.5	1.1
Maximum	792.9	677	16.94	1.88	9.97	19.84	17.96	12.98	1.9
Sum	4618.66	1859.4	231.3	17.53	2.2	236.95	250.6	135.41	22.31
Count	16	16	16	16	16	16	16	16	16

2.61 (a)

Count of 3YrReturn%	Column Labels																			
	Five			Five Total	Four			Four Total	One			One Total	Three			Three Total	Two			Two Total	Grand Total
Row Labels	Average	High	Low		Average	High	Low		Average	High	Low		Average	High	Low		Average	High	Low		
Growth	**7**	**1**	**1**	**9**	**35**	**7**	**3**	**45**	**11**	**7**	**1**	**19**	**95**	**16**	**7**	**118**	**51**	**23**	**4**	**78**	**269**
Large	6	1		7	18	1	2	21	9			9	47	2	7	56	28	2	4	34	127
Mid-Cap			1	1	15	1	1	17	2	3	1	6	37	2		39	18	8		26	89
Small	1			1	2	5		7		4		4	11	12		23	5	13		18	53
Value	**2**			**2**	**20**	**2**	**5**	**27**	**5**	**3**	**1**	**9**	**41**	**4**	**15**	**60**	**29**	**7**	**4**	**40**	**138**
Large	1			1	11		5	16	4	1		5	25		14	39	18		4	22	83
Mid-Cap	1			1	6			6	1	1	1	3	9		1	10	9	1		10	30
Small					3	2		5		1		1	7	4		11	2	6		8	25
Grand Total	**9**	**1**	**1**	**11**	**55**	**9**	**8**	**72**	**16**	**10**	**2**	**28**	**136**	**20**	**22**	**178**	**80**	**30**	**8**	**118**	**407**

Count of 3YrReturn%	Column Labels																			
	Five			Five Total	Four			Four Total	One			One Total	Three			Three Total	Two			Two Total	Grand Total
Row Labels	Average	High	Low		Average	High	Low		Average	High	Low		Average	High	Low		Average	High	Low		
Growth	**7**	**1**	**1**	**9**	**35**	**7**	**3**	**45**	**11**	**7**	**1**	**19**	**95**	**16**	**7**	**118**	**51**	**23**	**4**	**78**	**269**
Large	6	1		7	18	1	2	21	9			9	47	2	7	56	28	2	4	34	127
Mid-Cap			1	1	15	1	1	17	2	3	1	6	37	2		39	18	8		26	89
Small	1			1	2	5		7		4		4	11	12		23	5	13		18	53
Value	**2**			**2**	**20**	**2**	**5**	**27**	**5**	**3**	**1**	**9**	**41**	**4**	**15**	**60**	**29**	**7**	**4**	**40**	**138**
Large	1			1	11		5	16	4	1		5	25		14	39	18		4	22	83
Mid-Cap	1			1	6			6	1	1	1	3	9		1	10	9	1		10	30
Small					3	2		5		1		1	7	4		11	2	6		8	25
Grand Total	**9**	**1**	**1**	**11**	**55**	**9**	**8**	**72**	**16**	**10**	**2**	**28**	**136**	**20**	**22**	**178**	**80**	**30**	**8**	**118**	**407**

(b) Patterns of star rating conditioned on type, market cap and risk:

From Problem 2.58 (b), we know that the growth funds as a group, most are rated as three-star, followed by two-star, four-star, one-star and five-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 three-star rating, followed by two-star, four-star, one-star and five-star. If we want to bore further down into the subsets of star-rating among the large-cap growth funds, we see that similar pattern does not hold for the various risk ratings. For example, among the large-cap growth funds with an high-risk rating, most are rated as three-star and two-star each with equal portion, followed by equal shares of five-star and four-star with no one-star.

For the value funds as a group, most are rated as three-star, followed by two-star, four-star, one-star and five-star. Within the value funds, the large-cap and small-cap funds follow the same pattern as the value funds as a group. If we want to bore further down into the subsets of star-rating among the large-cap value funds, we see that similar pattern does not hold through for the various risk ratings. For example, among the large-cap value funds with an average-risk rating, the pattern is the same as the large-cap value funds as a group. However, among the large-cap value funds with a high-risk, they are all one-star funds.

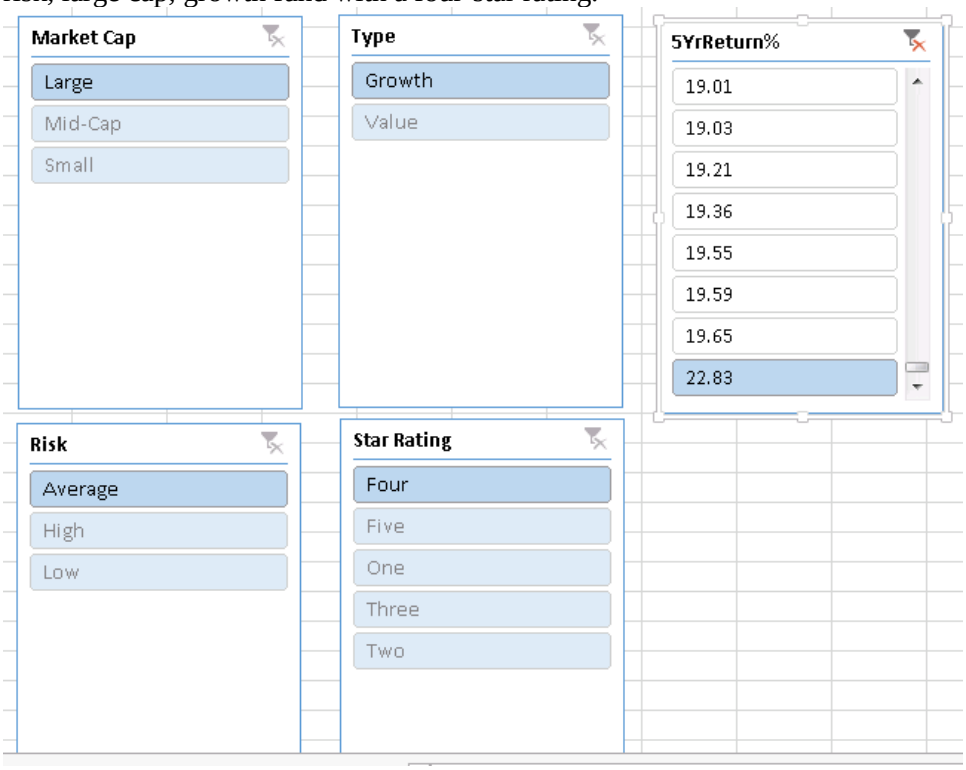
Patterns of market cap conditioned on type, risk and star-rating:

Again, from Problem 2.58 (b), we know that most of the growth funds are large-cap, followed by mid-cap and small-cap. The pattern is similar among the four-star, three-star, two-star and one-start growth funds but among the five-star growth funds, most are large-cap, followed by equal portions of small-cap and mid-cap. If we bore further down into the subsets of risk-rating, we see that similar pattern does not hold across the different risk levels. For example, among the high-risk, four-star, growth funds, most are small-cap followed by equal portions of large-cap and mid-cap.

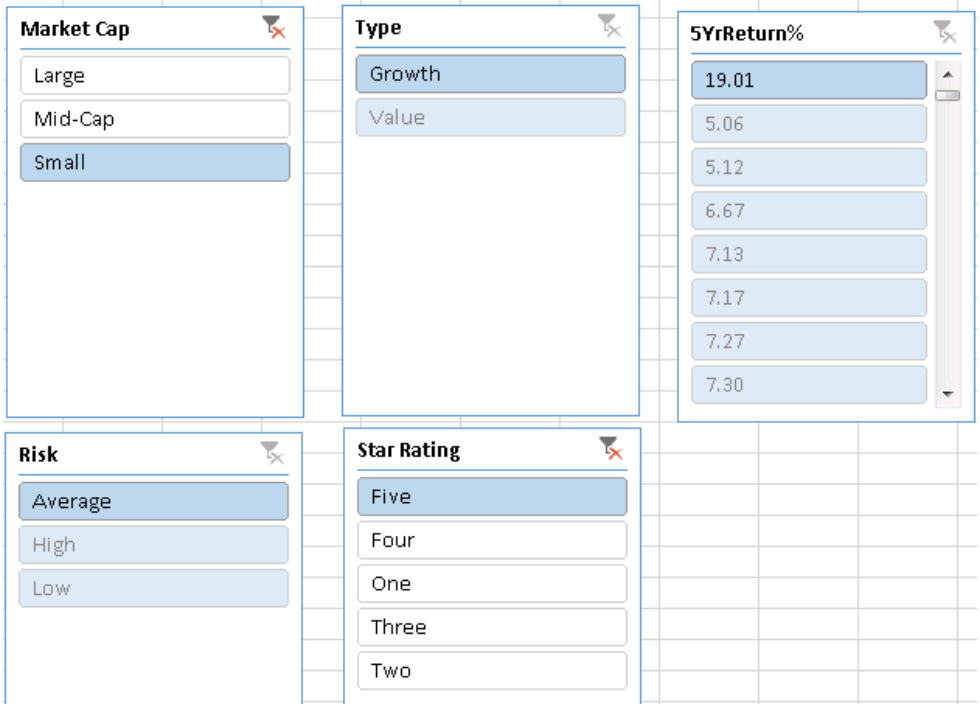
2.61 cont. (c) The tables for problems 2.58 through 2.60 are easier to interpret. With too many dimensions in the contingency table, it becomes very difficult to discern any pattern.

(d) There are many empty cells with no observation in the table in this problem as a result of increasing the dimension. Collapsing the table back to those in problems 2.58 through 2.60 though can result in potential loss of detailed information or pattern in the data.

2.62 With the help of the slicers, the fund with the highest five-year return at 22.83% is an average risk, large cap, growth fund with a four-star rating.

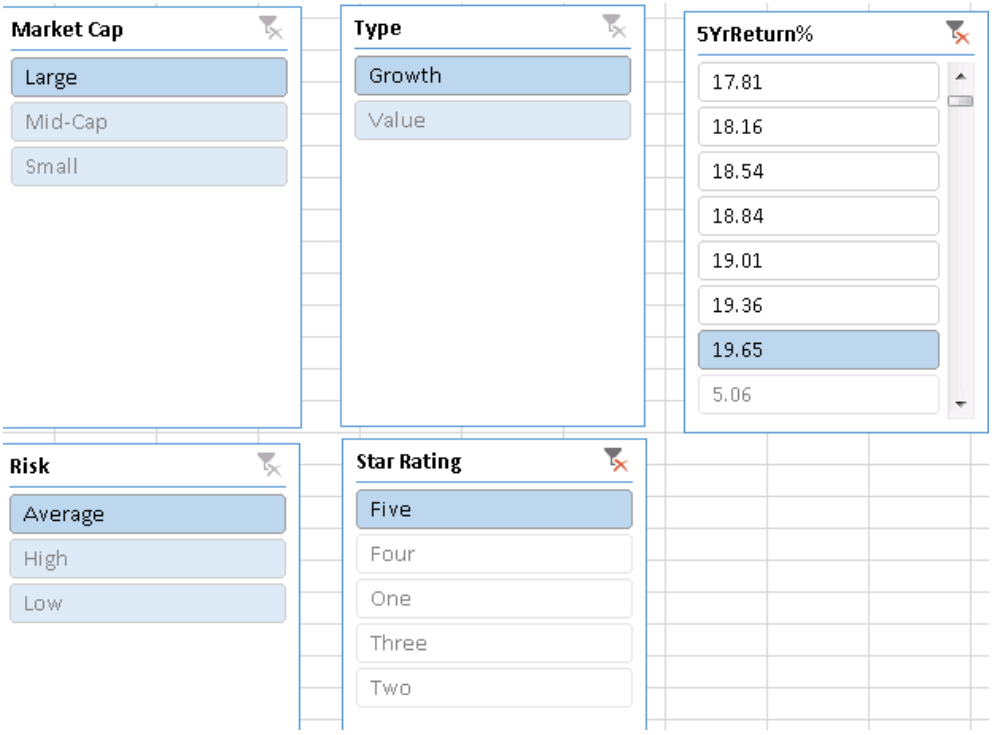


2.63 There is only one small cap fund with a five-star rating and its five-year return is 19.01%.

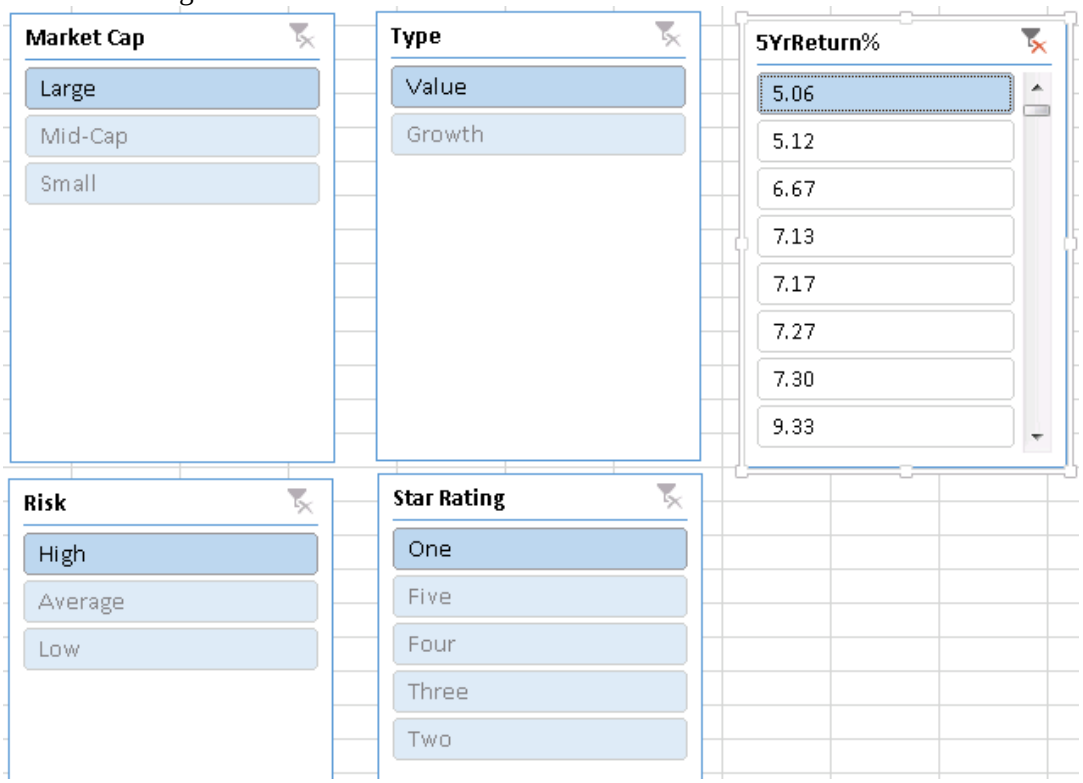


2.64 The fund with a fund number RF206 has the lowest five-year return at 5.06% and is a large cap, high risk, value fund with a one-star rating.

2.65 The five-star fund with the highest five-year return at 19.65% is a large cap, average risk, growth fund.



2.66 The funds that have the lowest five-year return at 5.06% is a large cap, high risk, value fund with a one-star rating.



2.67 (a)

Type	2010	2011	2012	2013	2014	
Android	23.3	49.2	69.0	78.8	81.5	
iOS	15.6	18.8	18.7	15.1	14.8	
Microsoft	4.9	1.8	2.5	3.3	2.7	
Blackberry	16.0	10.3	4.5	1.9	0.4	
OtherOS	40.2	19.8	5.4	1.0	0.6	

(b) The Android smartphone sales have been increasing since 2010 while those of the Blackberry and OtherOS have been decreasing since 2010. The iOS smartphone sales had been increasing since 2010 and reached the peak in 2011 and started a downward trend since. The Microsoft smartphone sales had been decreasing since 2010 and reached the trough in 2012 but had seen a comeback since.

2.68 (a)

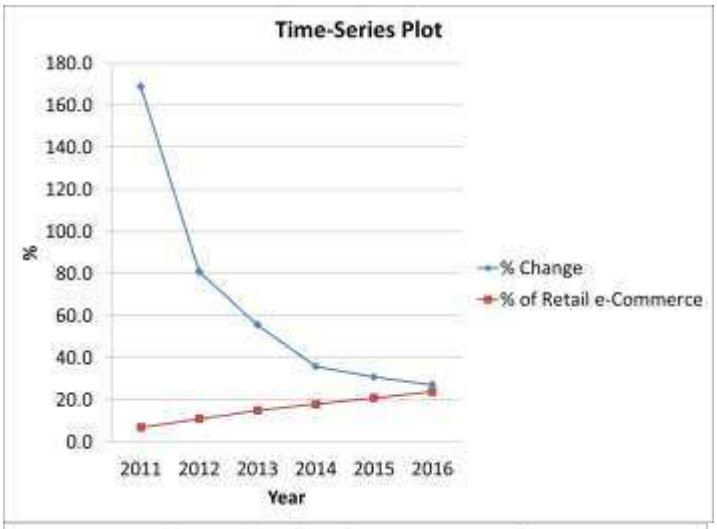
Index	2009	2010	2011	2012	2013	
Dow Transportation	15.9	24.6	-1.7	5.7	39.5	
NASDAQ Composite	43.9	16.9	-1.8	15.9	38.3	
Russell 2000	25.2	25.3	-5.5	14.6	37.0	
NSADAQ 100	53.5	19.2	2.7	16.8	35.0	
S&P Midcap	35.0	24.9	-3.1	16.1	31.6	
Wilshire 5000	27.1	15.7	-1.0	13.7	31.4	
S&P 500	23.5	12.8	0.0	13.4	29.6	
Dow Industrials	18.8	11.0	5.5	7.3	26.5	
Dow Utilities	7.3	1.8	14.7	-2.5	8.3	

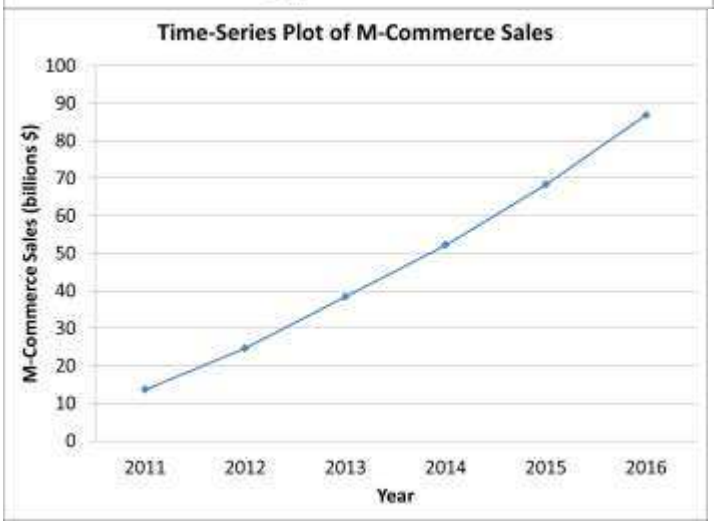
(b) All indices reached their trough in 2011 and have been on the upward trend since with the exception of the Dow Utilities which reach its peak in 2011.

2.71 (a) There is a title.

(b) None of the axes are labeled.

(c)

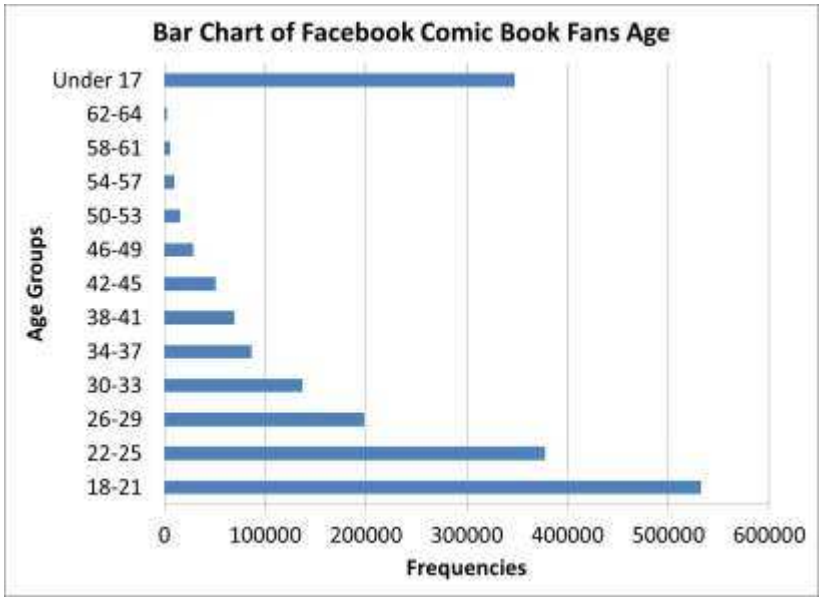


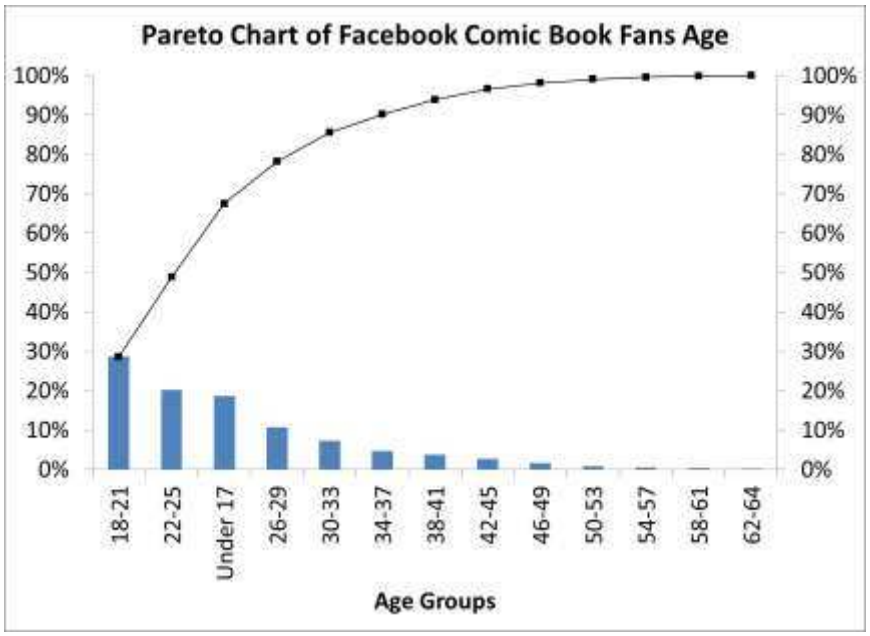


2.72 (a) There is a title.

(b) The simplest possible visualization is not used.

(c)

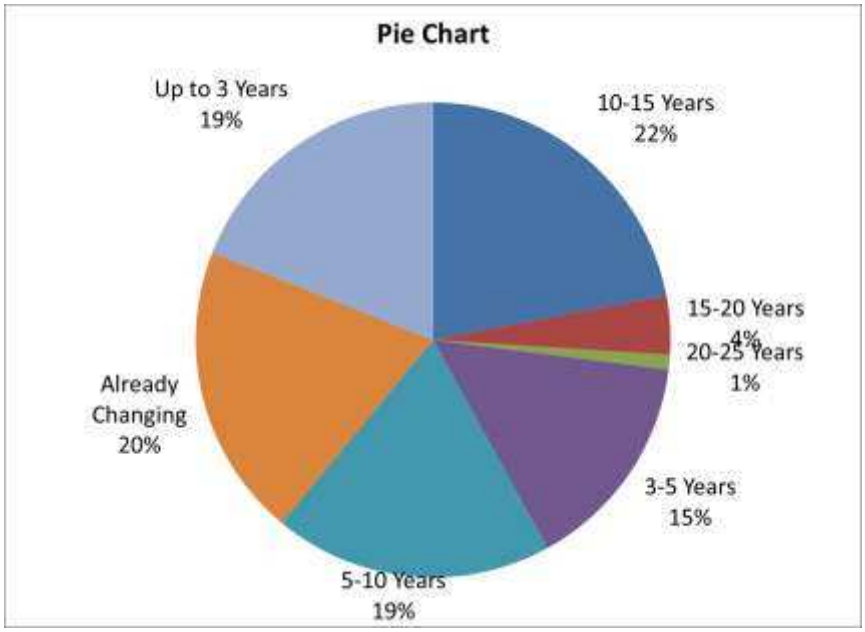


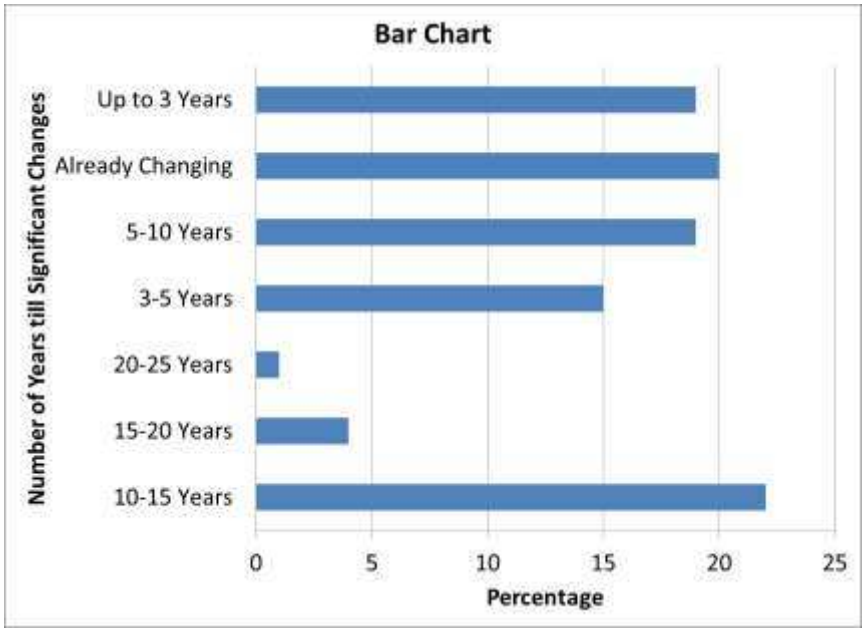


2.73 (a) None.

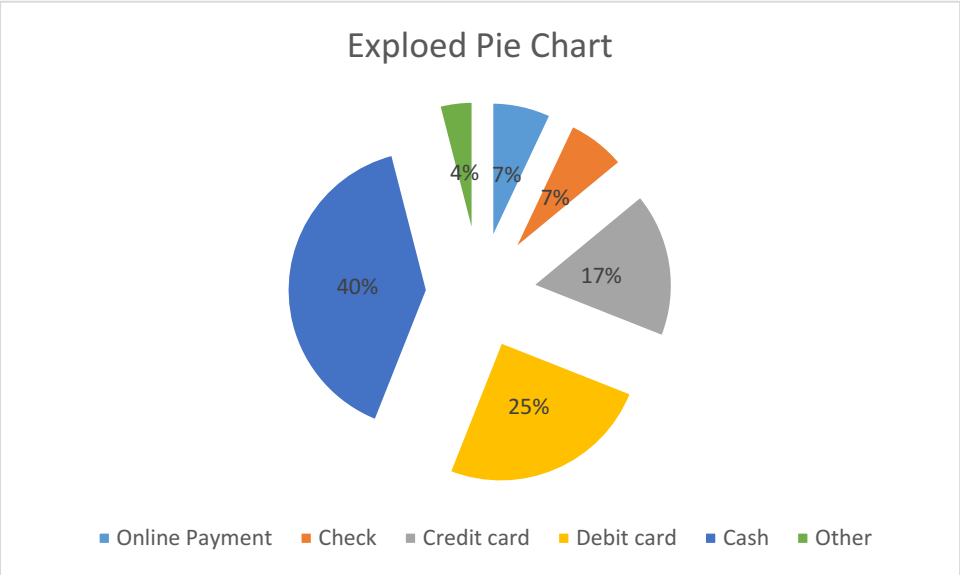
(b) The use of chartjunk.

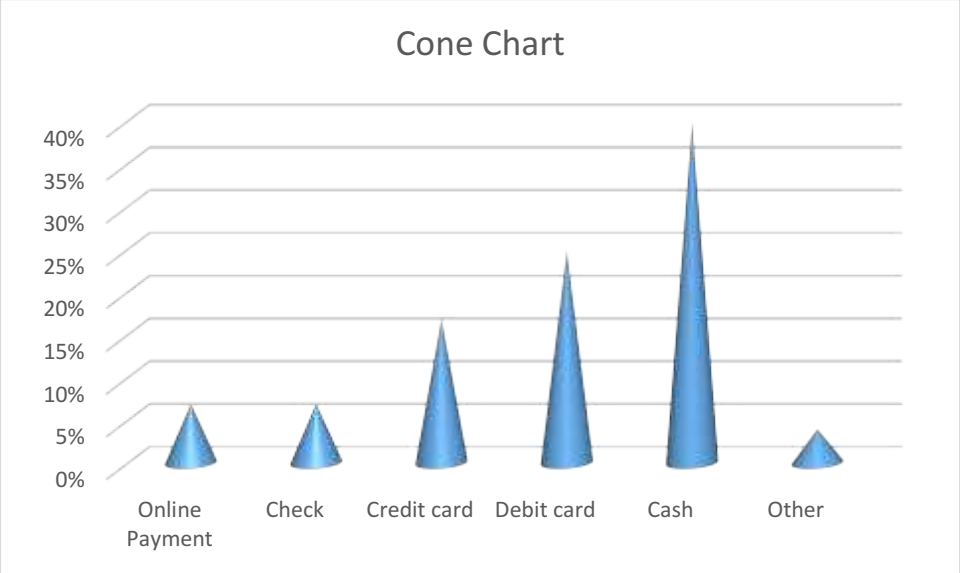
(c)



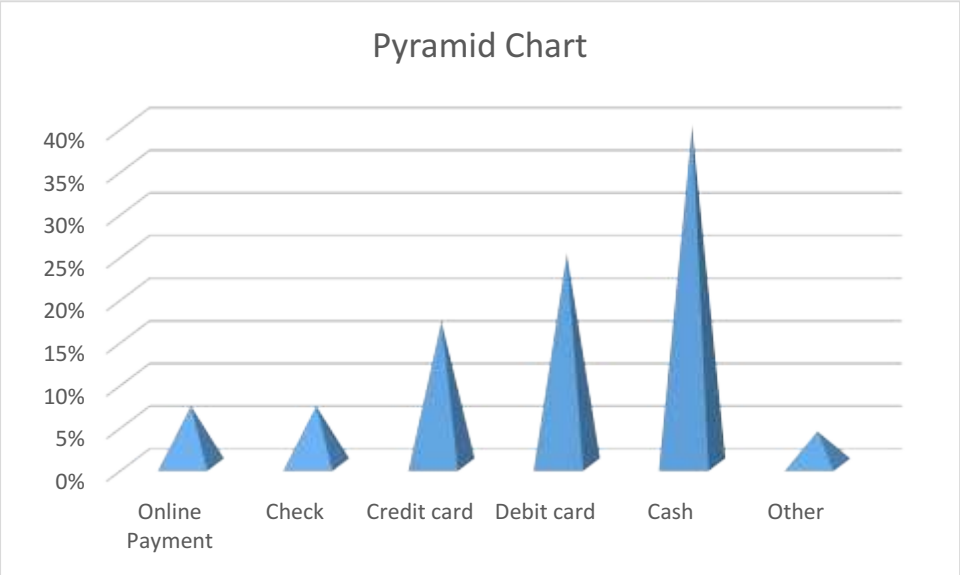


2.75 (a)


Exploded Pie Chart
4%
7%
7%
17%
25%
40%
Online Payment
Check
Credit card
Debit card
Cash
Other

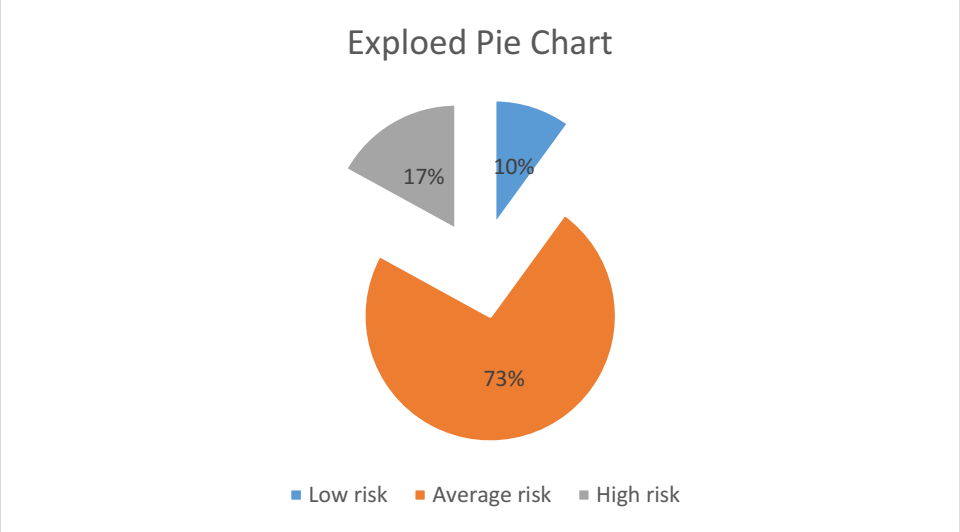

Cone Chart
40%
35%
30%
25%
20%
15%
10%
5%
0%
Online Payment
Check
Credit card
Debit card
Cash
Other

2.75 cont. (a)

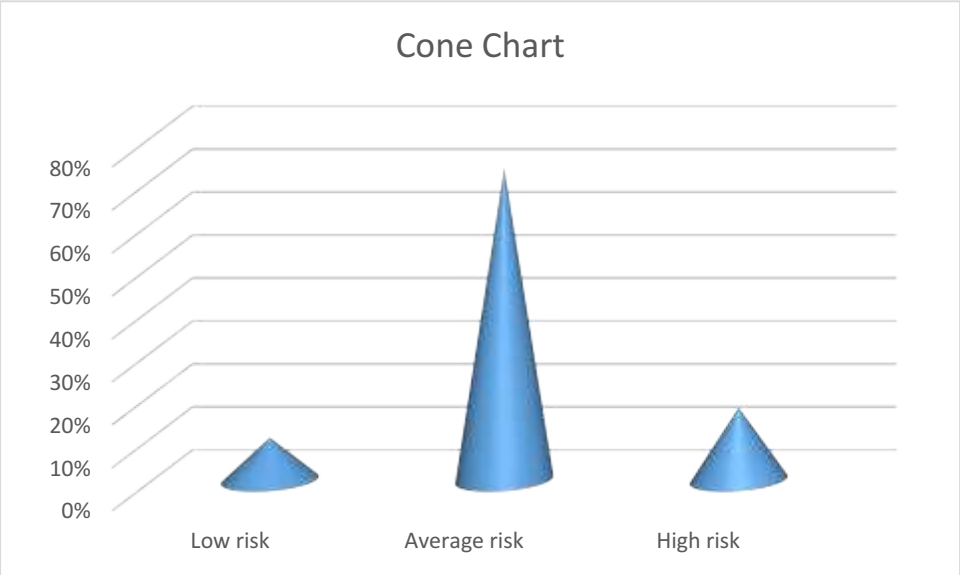


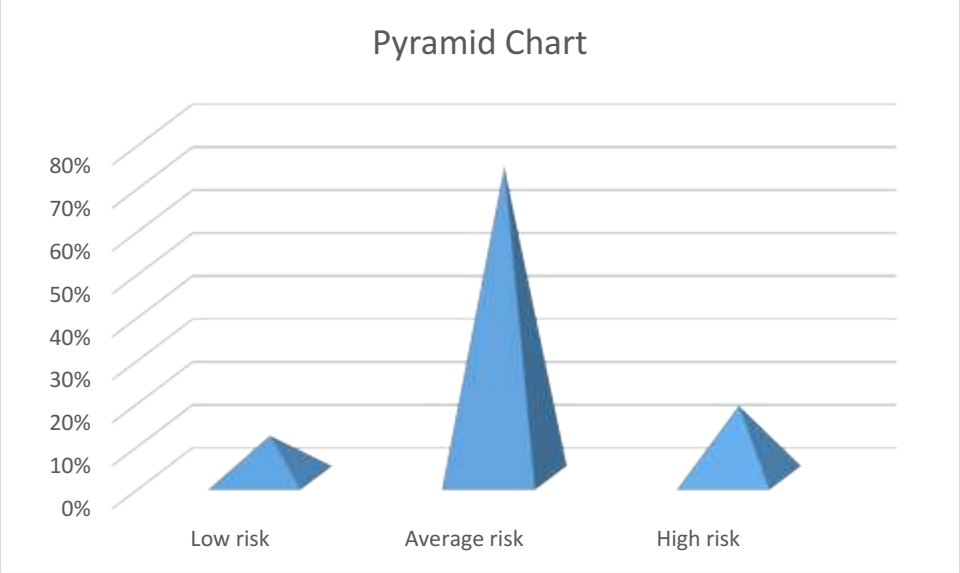
(b) The bar chart and the pie chart should be preferred over the exploded pie chart, doughnut chart, the cone chart and the pyramid chart since the former set is simpler and easier to interpret.

2.76 (a)



2.76 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.

2.77 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.

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

2.79 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.

2.80 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.

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

2.82 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.

2.83 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.

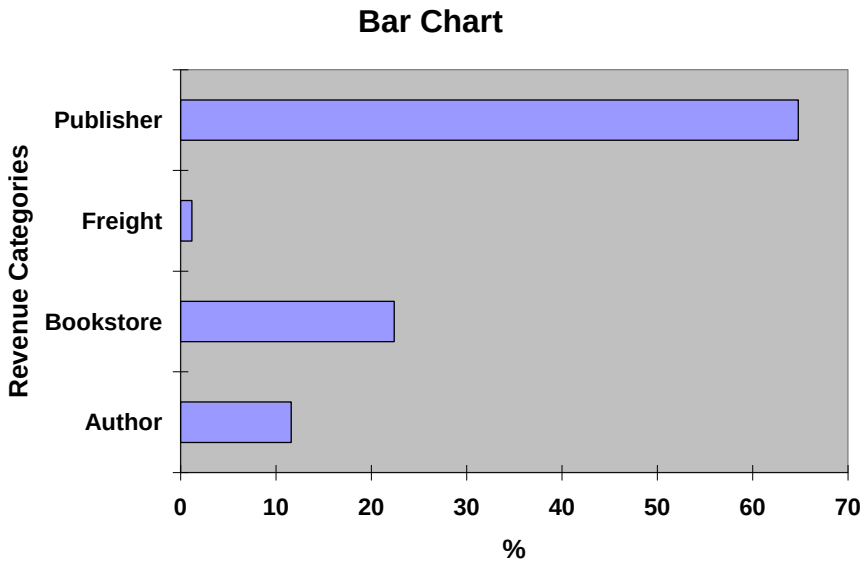
2.84 A contingency table contains information on two categorical variables whereas a multidimensional table can display information on more than two categorical variables.

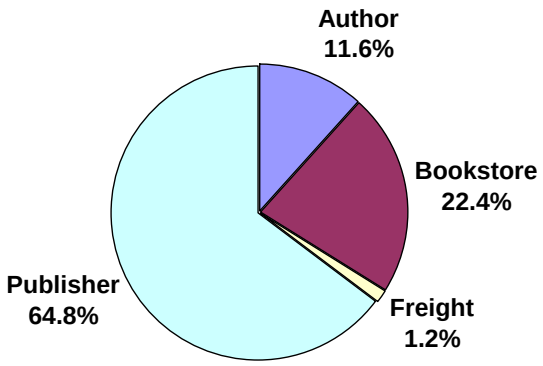
2.85 The multidimensional PivotTable can reveal additional patterns that cannot be seen in the contingency table. One can also change the statistic displayed and compute descriptive statistics which can add insight into the data.

2.86 In a PivotTable in Excel, double-clicking a cell drills down and causes Excel to display the underlying data in a new worksheet to enable you to then observe the data for patterns. In Excel, a slicer is a panel of clickable buttons that appears superimposed over a worksheet to enable you to work with many variables at once in a way that avoids creating an overly complex multidimensional contingency table that would be hard to comprehend and interpret.

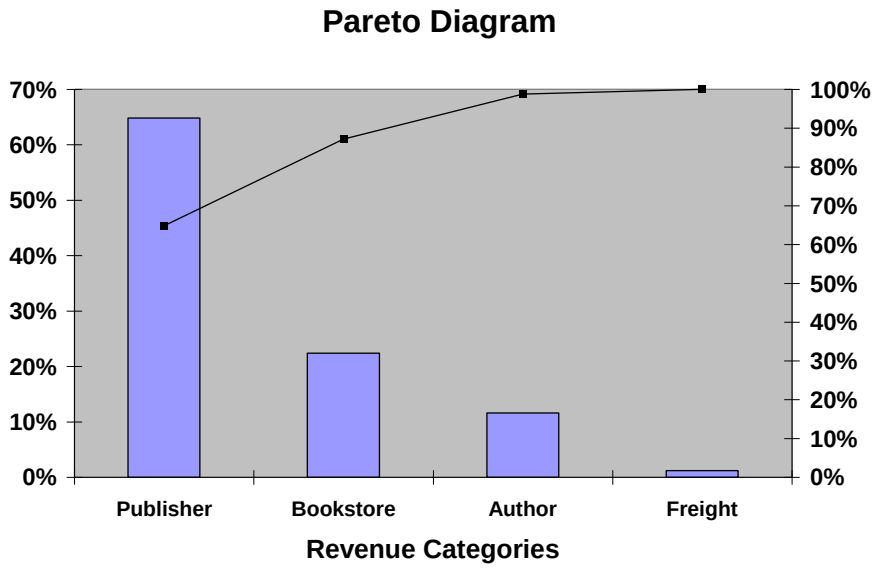
2.87 Sparklines are compact time-series visualizations of numerical variables. Sparklines can also be used to plot time-series data using smaller time units than a time-series plot to reveal patterns that the time-series plot may not.

2.88 (a)

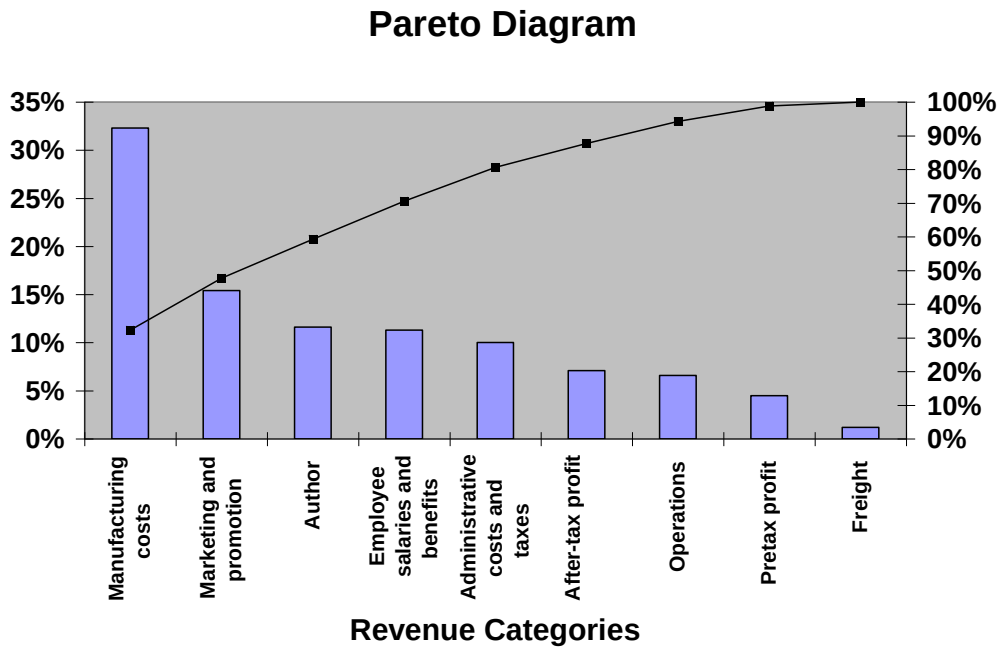

Bar Chart
Revenue Categories
Publisher
Freight
Bookstore
Author
0
10
20
30
40
50
60
70
%


Pie Chart
Author
11.6%
Bookstore
22.4%
Publisher
64.8%
Freight
1.2%

2.88 cont. (a)

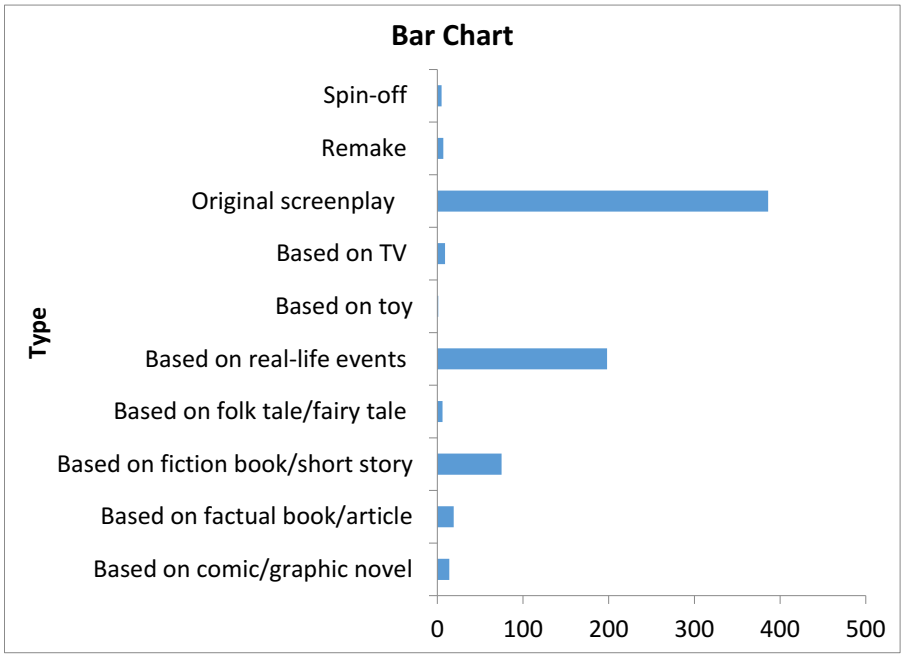


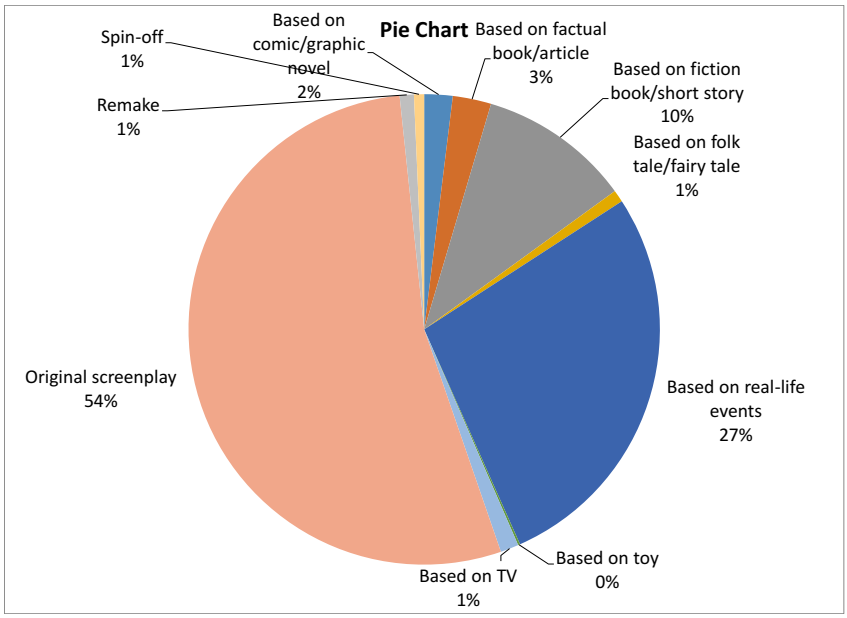
(b)



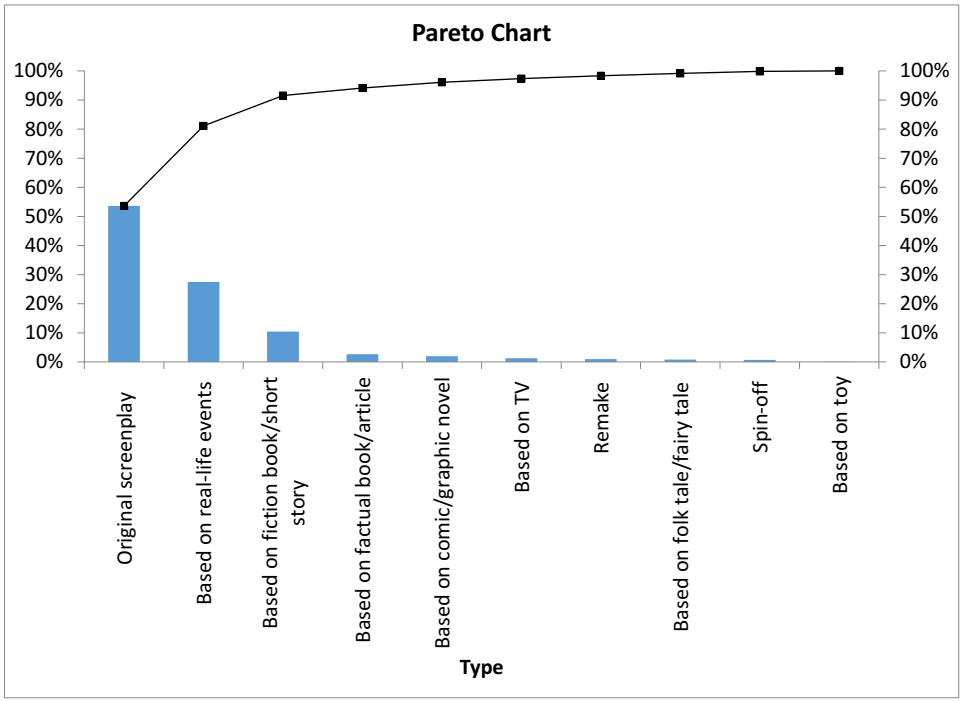
(c) The publisher gets the largest portion (64.8%) of the revenue. About half (32.3%) of the revenue received by the publisher covers manufacturing costs. The publisher's marketing and promotion account for the next largest share of the revenue, at 15.4%. Author, bookstore employee salaries and benefits, 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.

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

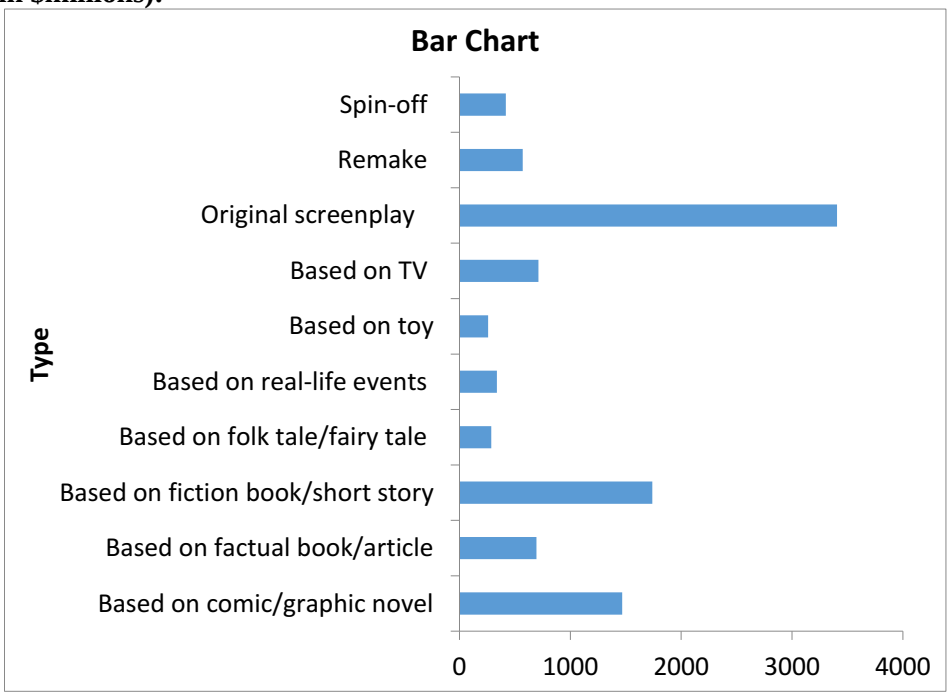




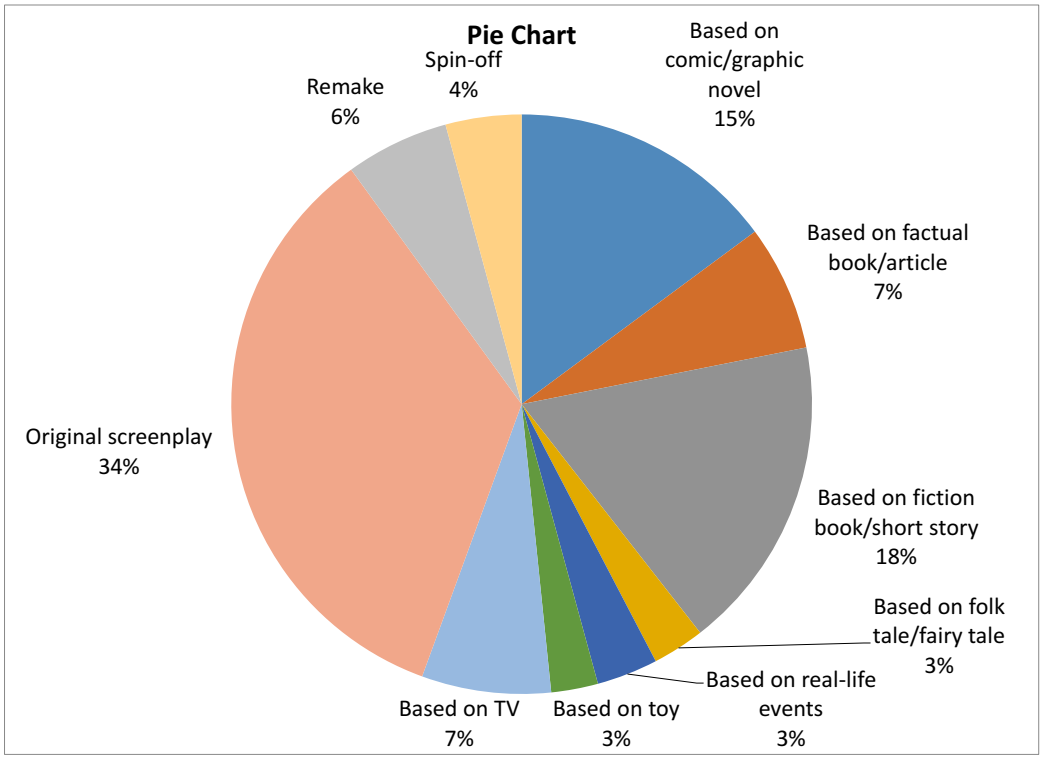
2.89 cont. (a)

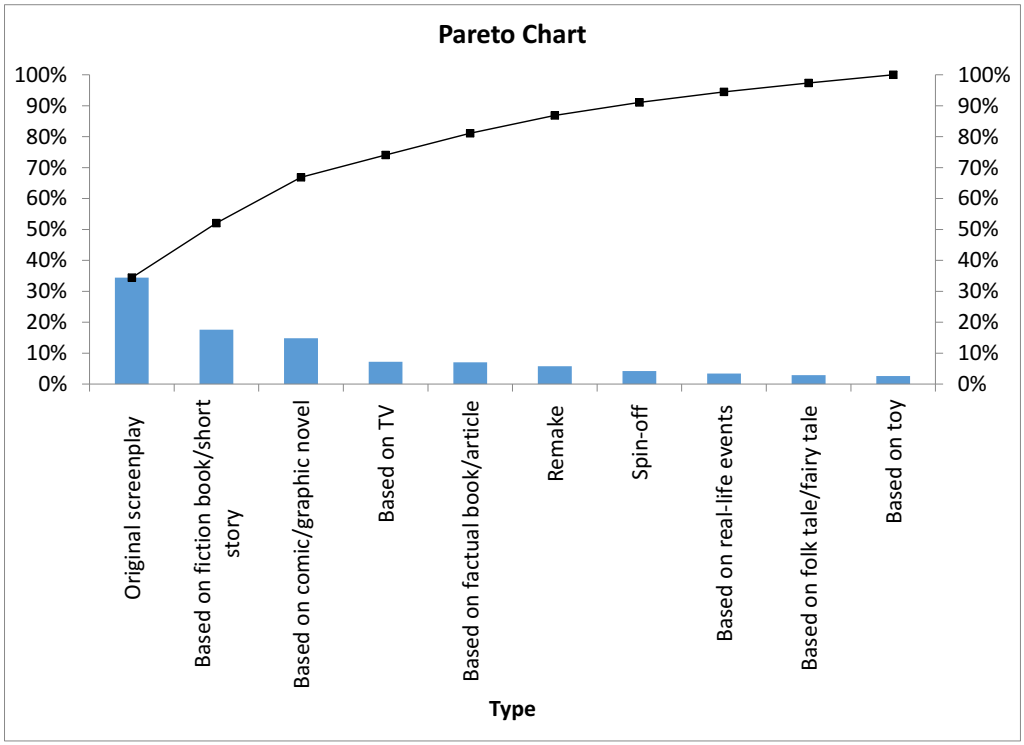


Gross (in $millions):

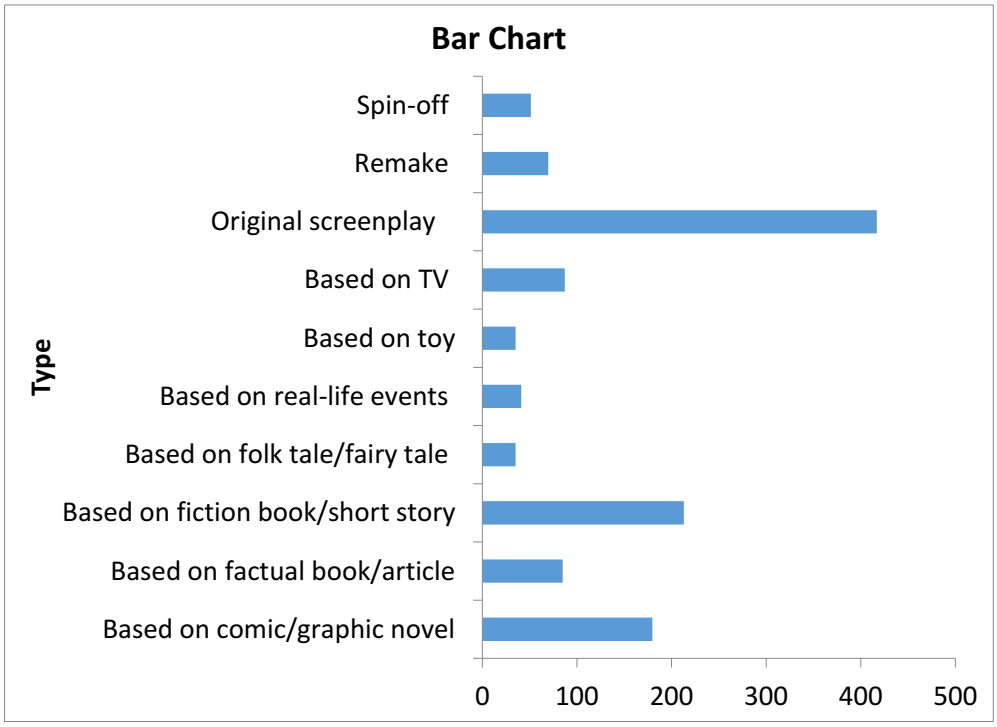


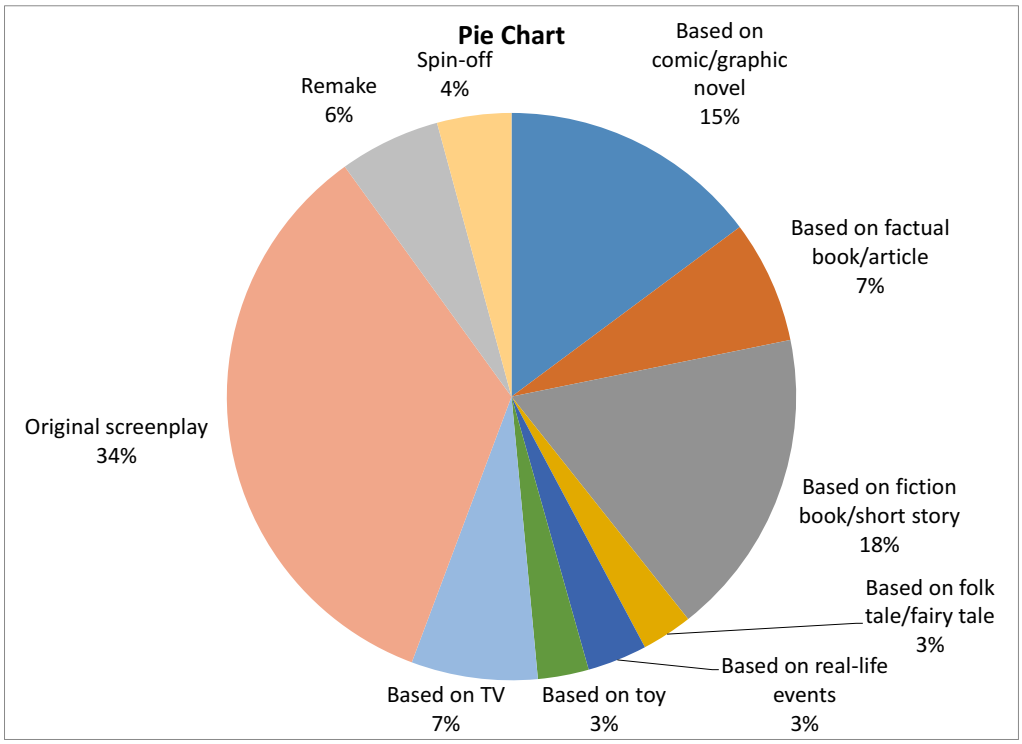
2.89 (a) cont.


Pie Chart
Based on comic/graphic novel 15%
Based on factual book/article 7%
Based on fiction book/short story 18%
Based on folk tale/fairy tale 3%
Based on real-life events 3%
Based on toy 3%
Based on TV 7%
Original screenplay 34%
Remake 6%
Spin-off 4%

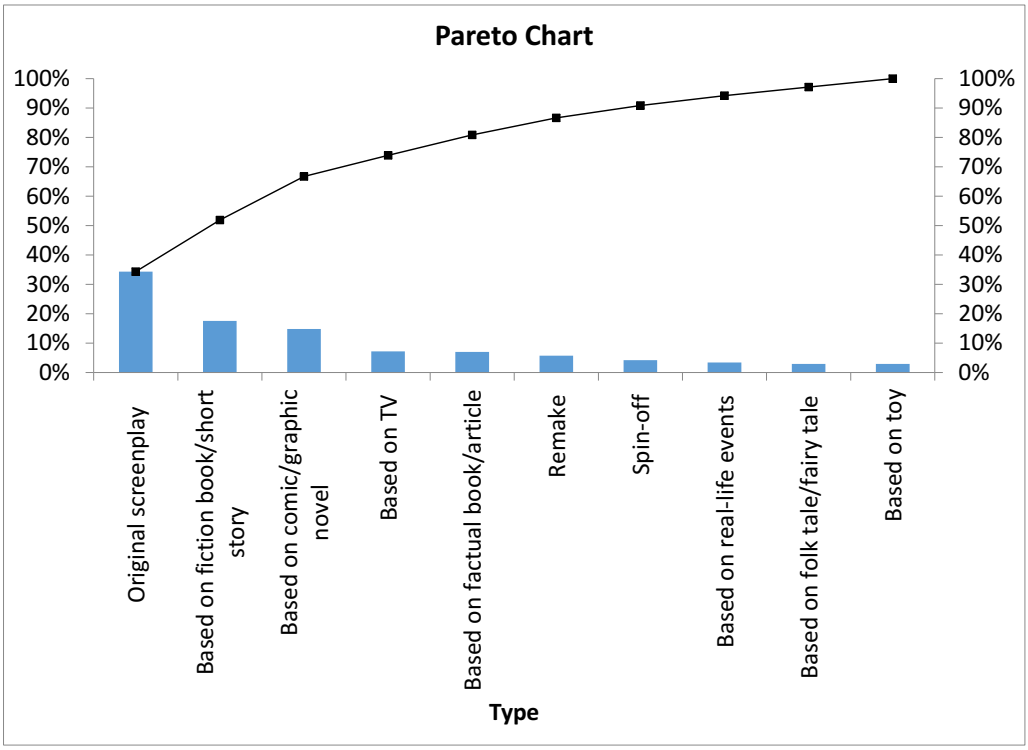

Pareto Chart
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Original screenplay
Based on fiction book/short story
Based on comic/graphic novel
Based on TV
Based on factual book/article
Remake
Spin-off
Based on real-life events
Based on folk tale/fairy tale
Based on toy
Type

2.89 cont. (a) **Number of Tickets Sold (millions):**



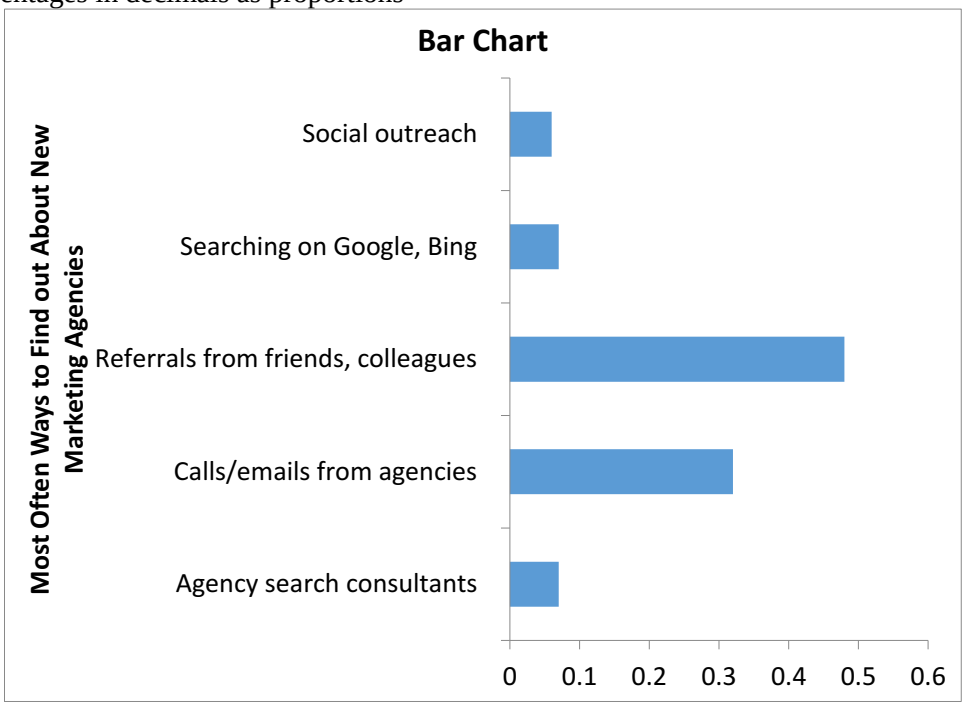


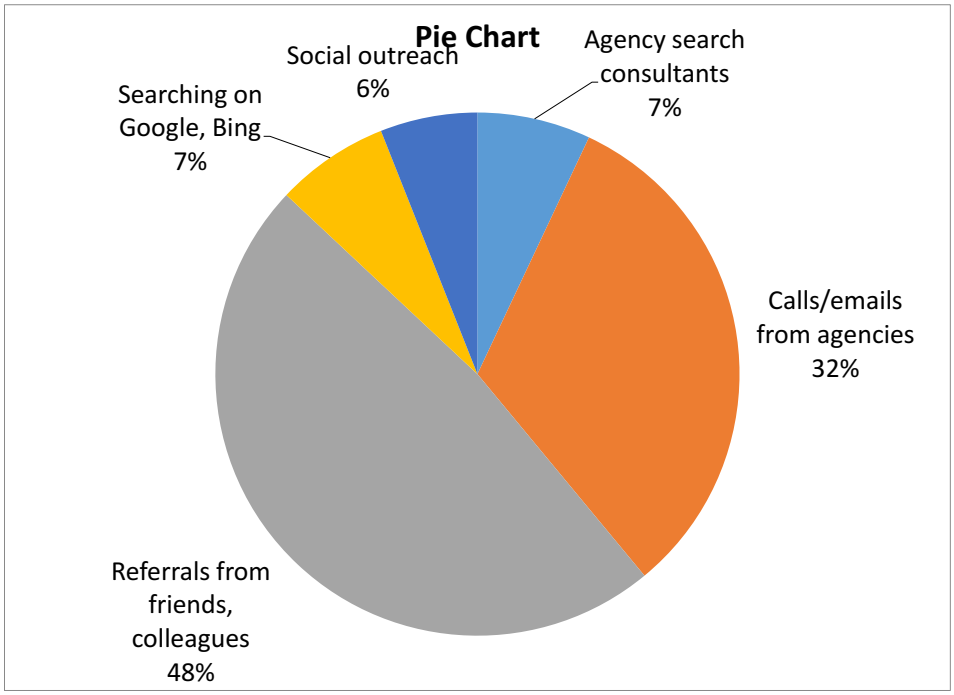
2.89 cont. (a)



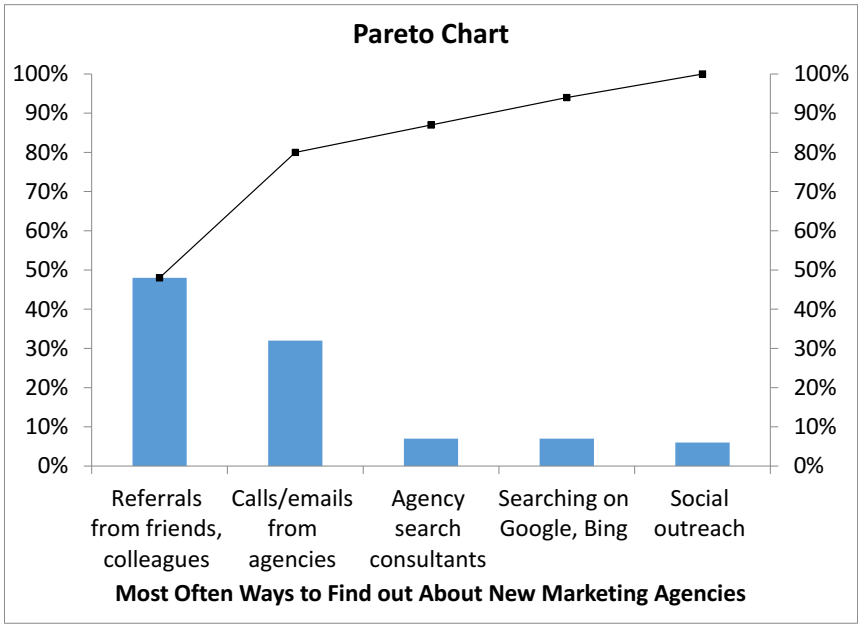
(b) Based on the Pareto chart for the number of movies, "Original screenplay", "Based on real life events" and "Based on fiction/short story" are the "vital few" and capture about 92% of the market share. According to the Pareto chart for gross (in $millions), "Original screenplay", "Based on fiction book/short story" and "Based on comic/graphic novel" are the "vital few" and capture about 67% of the market share. According to the Pareto chart for number of tickets sold (in millions), "Original screenplay", "Based on fiction book/short story" and "Based on comic/graphic novel" are the "vital few" and capture about 67% of the market share.

2.90 (a) Percentages in decimals as proportions



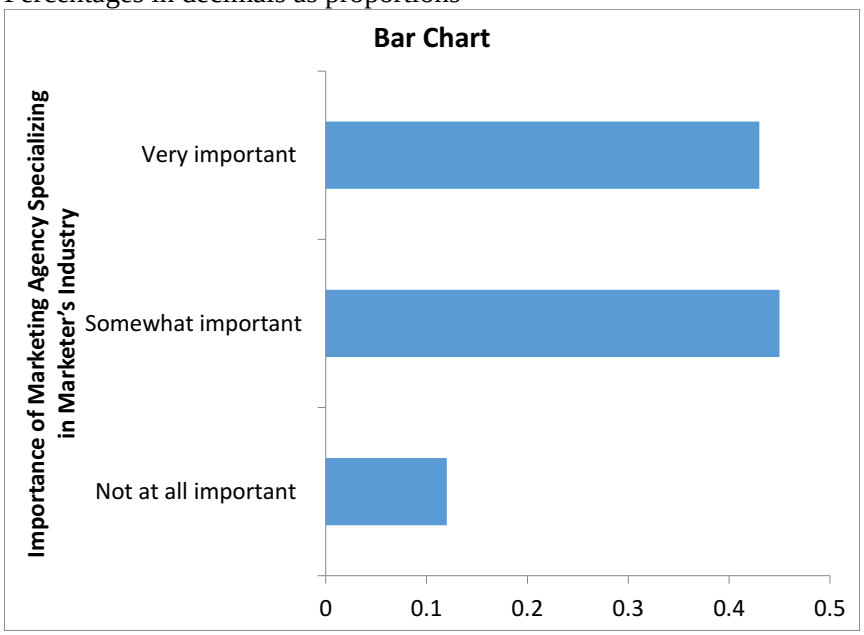


2.90 cont. (a)

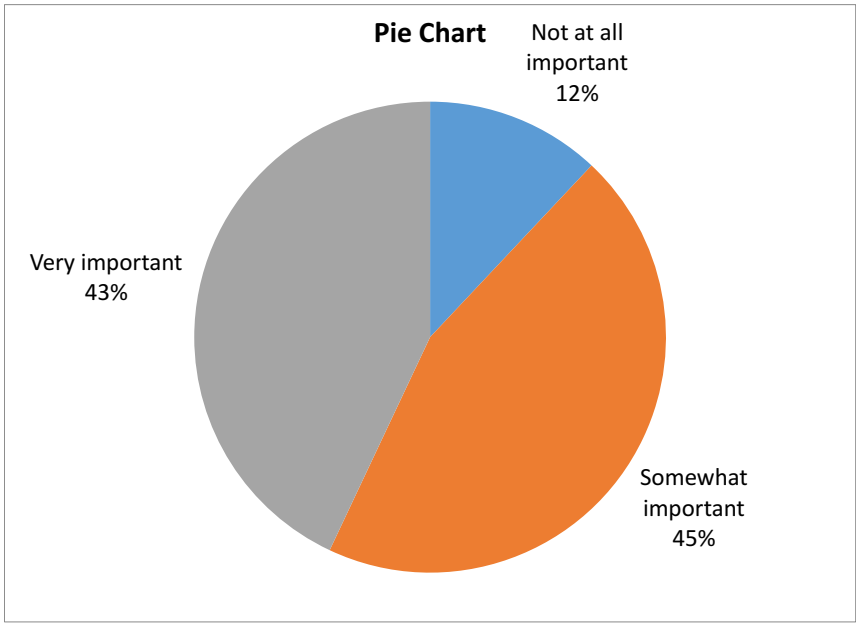


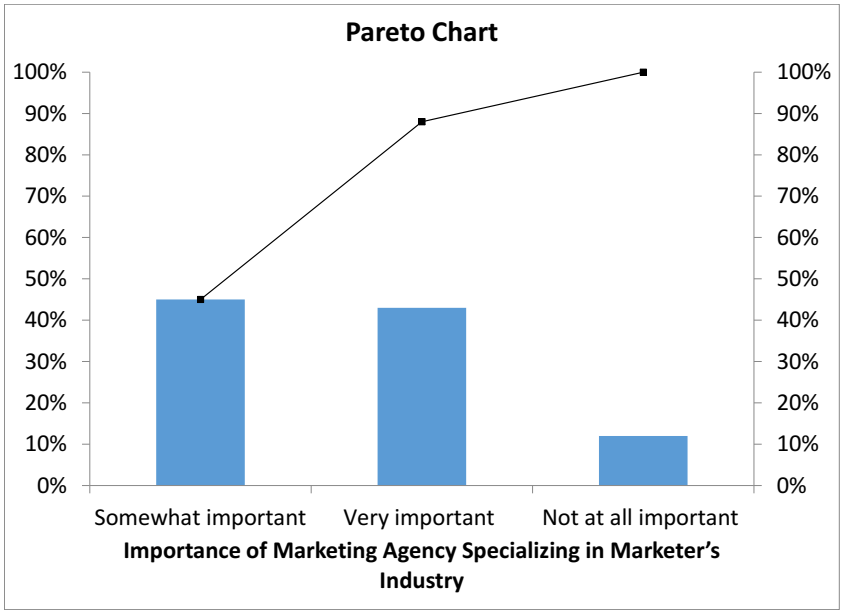
(b) The pie chart may be best since with only five categories, it enables you to see the portion of the whole in each category.

(c) Percentages in decimals as proportions



2.90 cont. (c)





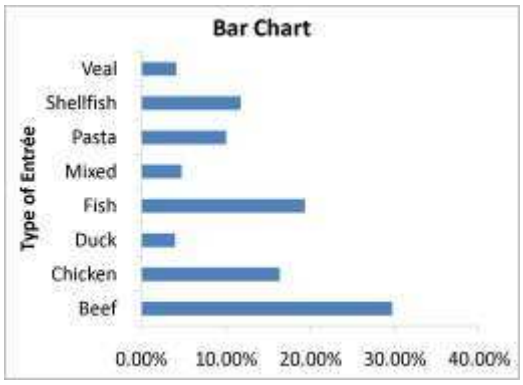
(d) The pie chart may be best since, with only four categories it enables you to see the portion of the whole in each category.

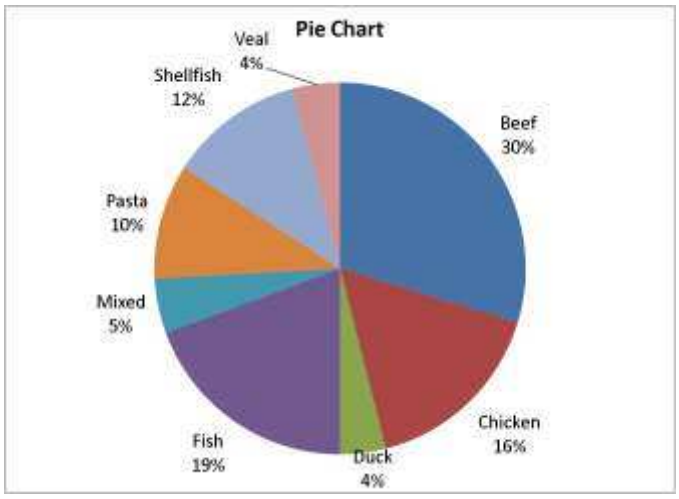
(e) Based on the Pareto chart for "Most Often Ways to Find out About New Marketing Agencies", about 80% of the marketers use "referrals from friends/colleagues" and "calls/emails from agencies" to find out about new marketing agencies for hire. Based on the Pareto chart for "Importance of Marketing Agency Specializing in Marketer's Industry", about 88% of the marketers value the marketing agencies that specialize in their industry as "somewhat important" or "very important".

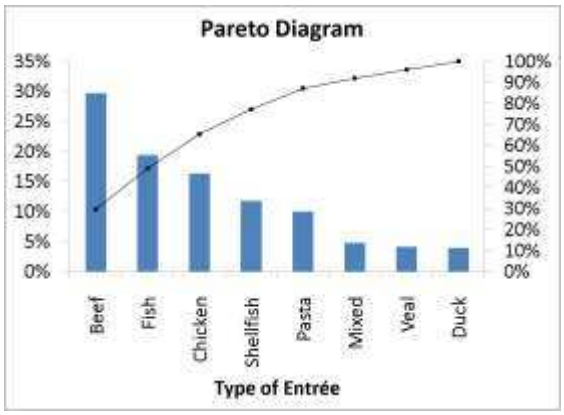
2.91 (a)

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)







2.91 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.

2.92 (a)

Count of Dessert Ordered	Gender		
Desserts Ordered	Male	Female	Grand Total
Yes	34.25%	65.75%	100.00%
No	51.65%	48.35%	100.00%
Grand Total	**47.62%**	**52.38%**	**100.00%**

Count of Dessert Ordered	Gender		
Desserts Ordered	Male	Female	Grand Total
Yes	16.67%	29.09%	23.17%
No	83.33%	70.91%	76.83%
Grand Total	**100.00%**	**100.00%**	**100.00%**

Count of Dessert Ordered	Gender		
Desserts Ordered	Male	Female	Grand Total
Yes	7.94%	15.24%	23.17%
No	39.68%	37.14%	76.83%
Grand Total	**47.62%**	**52.38%**	**100.00%**

Count of Dessert Ordered	Beef Entrée		
Dessert Ordered	Yes	No	Grand Total
Yes	52.11%	47.89%	100.00%
No	25.20%	74.80%	100.00%
Grand Total	**31.27%**	**68.73%**	**100.00%**

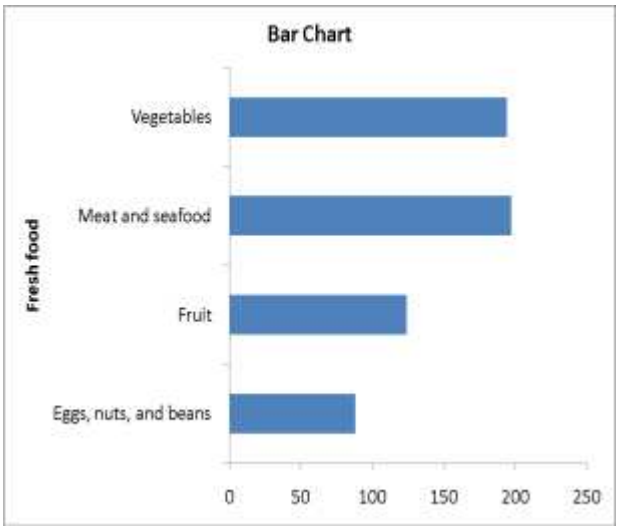
Count of Dessert Ordered	Beef Entrée		
Dessert Ordered	Yes	No	Grand Total
Yes	37.56%	15.70%	22.54%
No	62.44%	84.30%	77.46%
Grand Total	**100.00%**	**100.00%**	**100.00%**

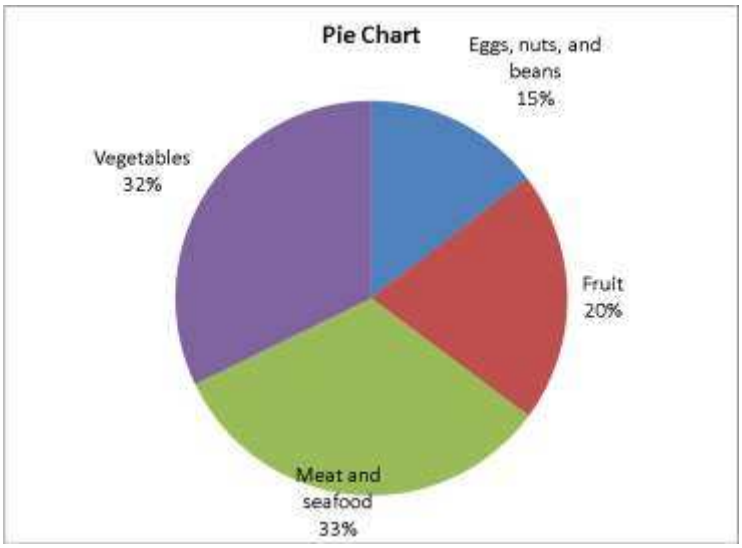
Count of Dessert Ordered	Beef Entrée		
Dessert Ordered	Yes	No	Grand Total
Yes	11.75%	10.79%	22.54%
No	19.52%	57.94%	77.46%
Grand Total	**31.27%**	**68.73%**	**100.00%**

2.92 cont. (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.

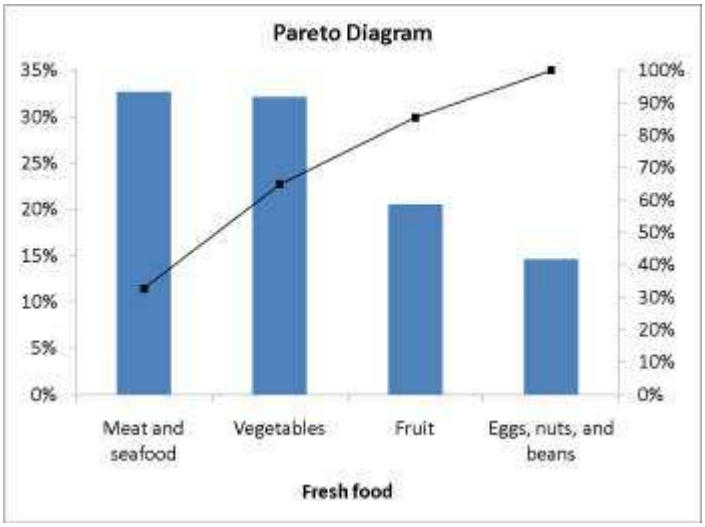
(c) 16.67% of the men sampled ordered desserts compared to 29.09% of the women. Women are almost twice as likely to order desserts as men. 37.56% of the patrons ordering a beef entree ordered dessert compared to less than 15.7% of patrons ordering all other entrees. Patrons ordering beef are better than 2.3 times as likely to order dessert as patrons ordering any other entree.

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

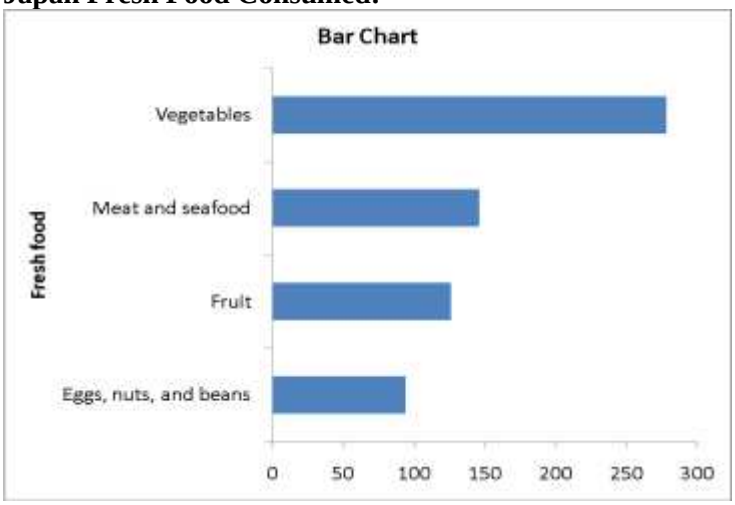


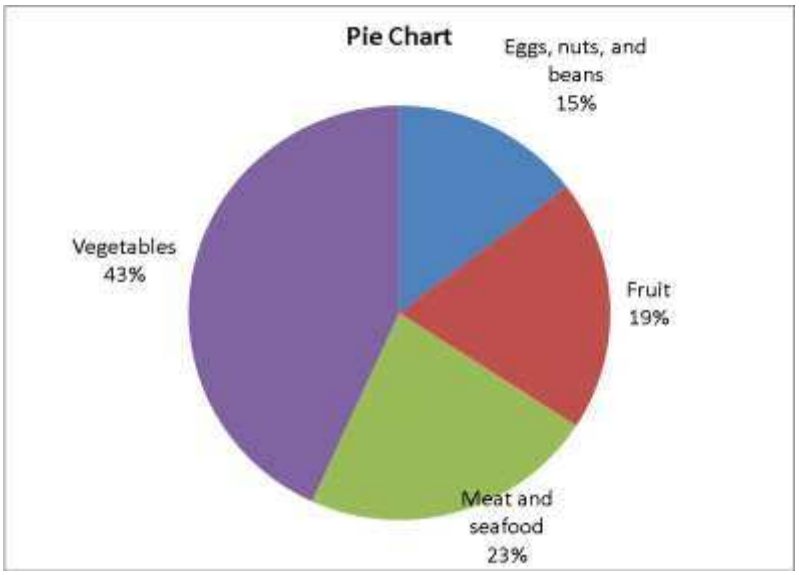


2.93 (a)
cont.

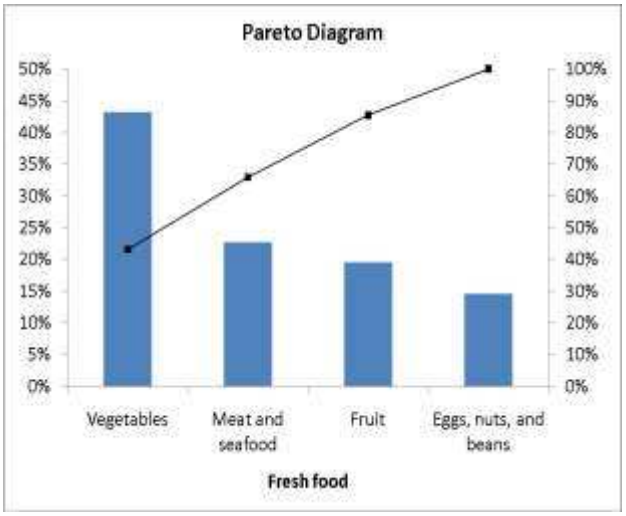


Japan Fresh Food Consumed:

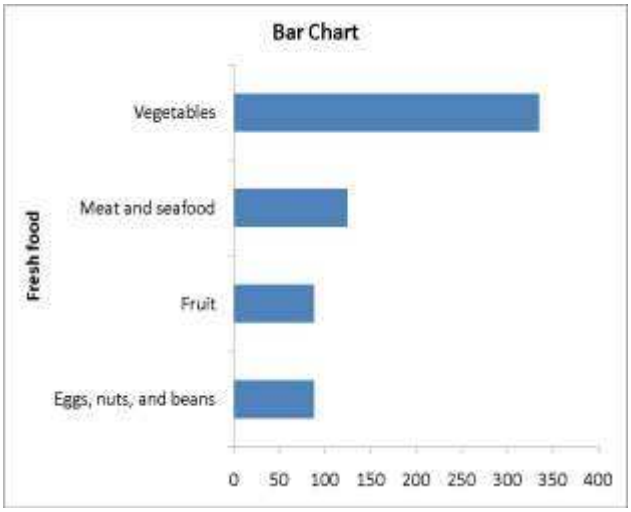


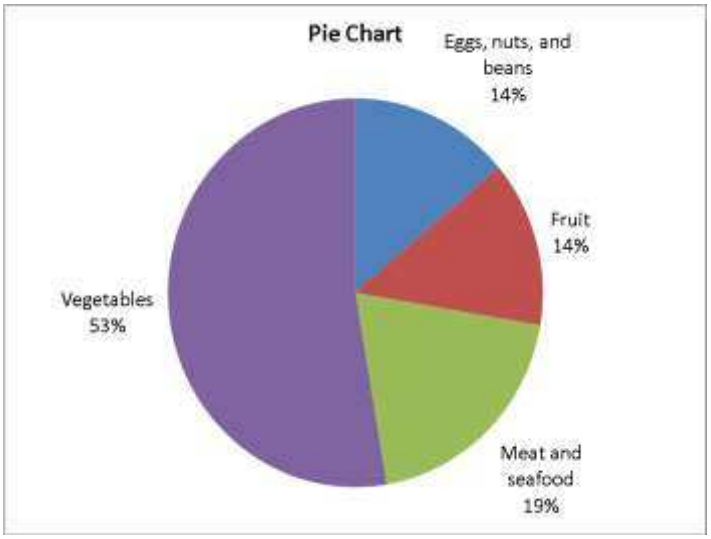


2.93 (a)
cont.

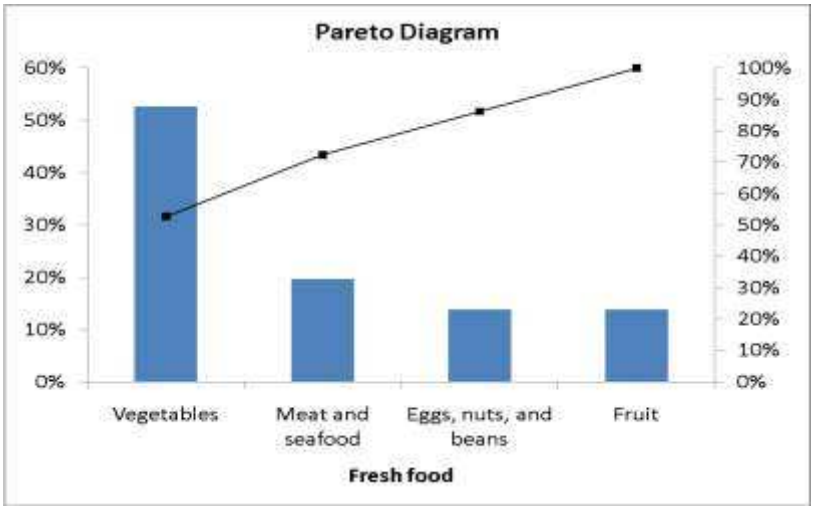


Russia Fresh Food Consumed:

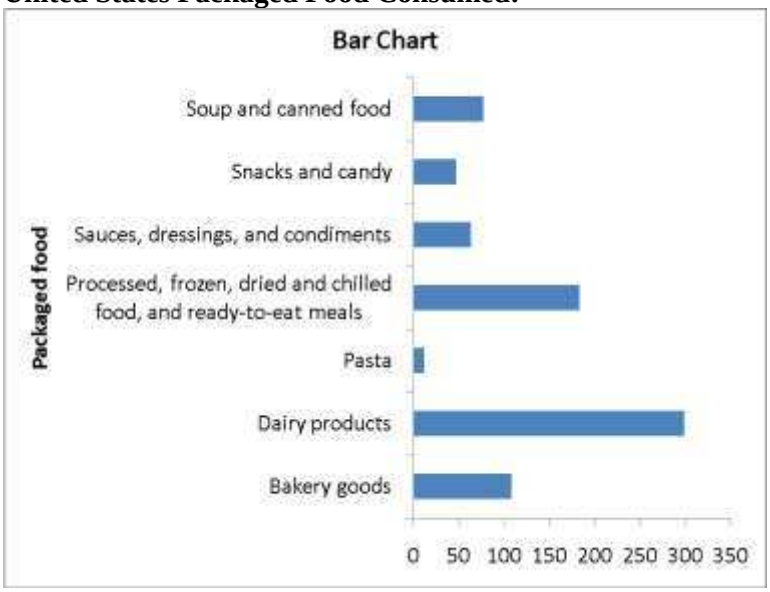




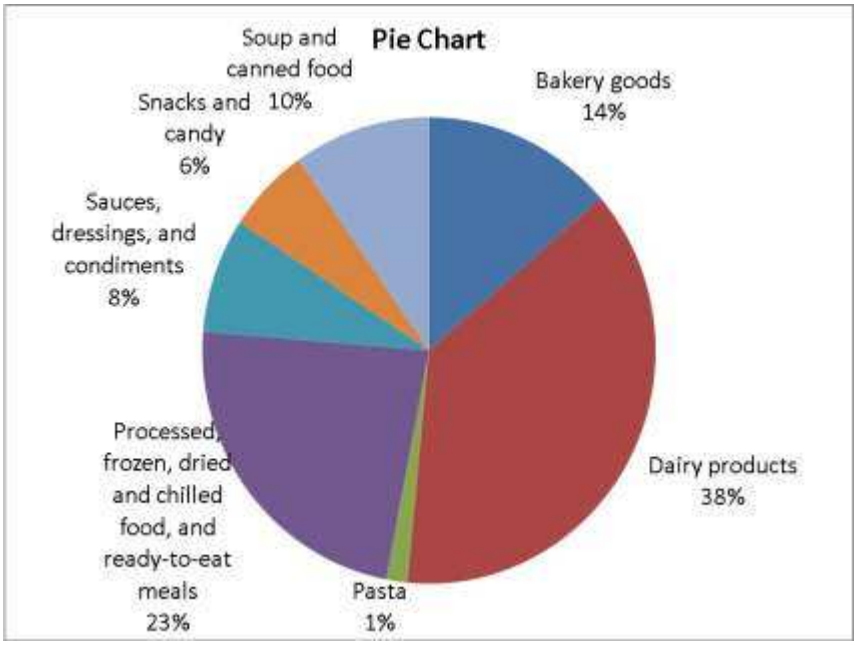
2.93 cont. (a)

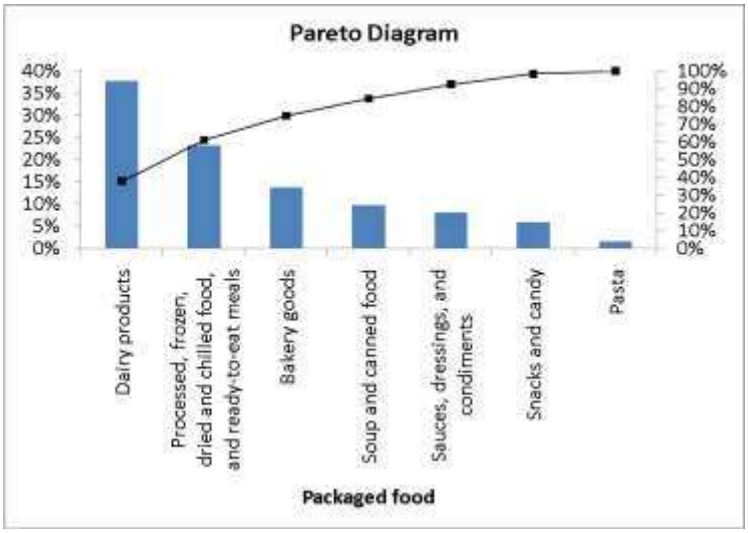


(b) **United States Packaged Food Consumed:**

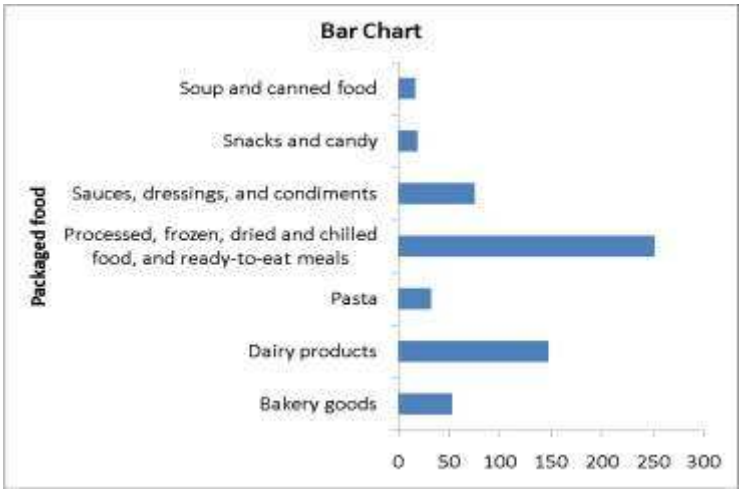


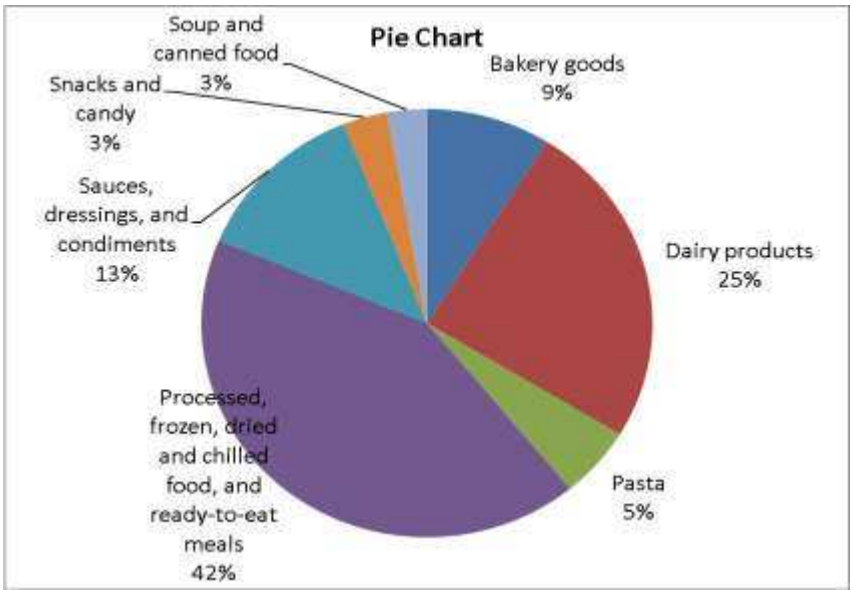
2.93 (b)
cont.


Pie Chart
Soup and canned food 10%
Bakery goods 14%
Snacks and candy 6%
Sauces, dressings, and condiments 8%
Processed, frozen, dried and chilled food, and ready-to-eat meals 23%
Pasta 1%
Dairy products 38%

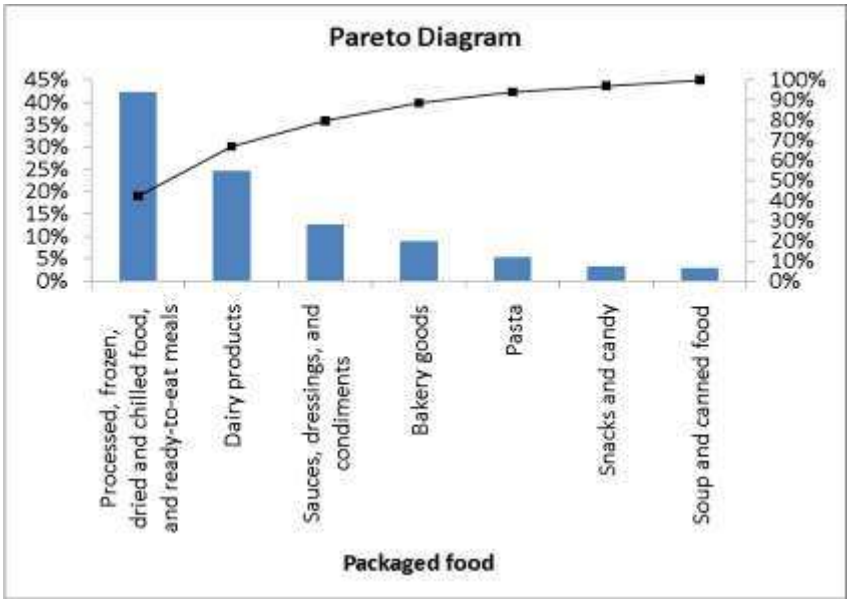

Pareto Diagram
40%
35%
30%
25%
20%
15%
10%
5%
0%
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Dairy products
Processed, frozen, dried and chilled food, and ready-to-eat meals
Bakery goods
Soup and canned food
Sauces, dressings, and condiments
Snacks and candy
Pasta
Packaged food

2.93 cont. (b) **Japan Packaged Food Consumed:**

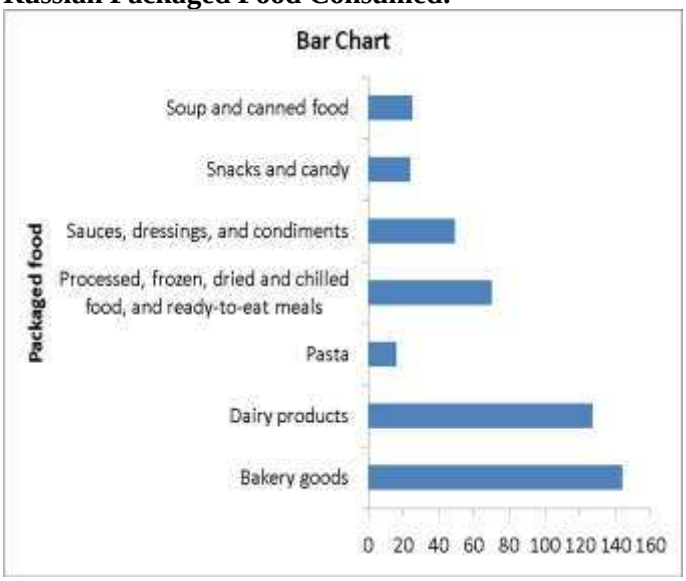




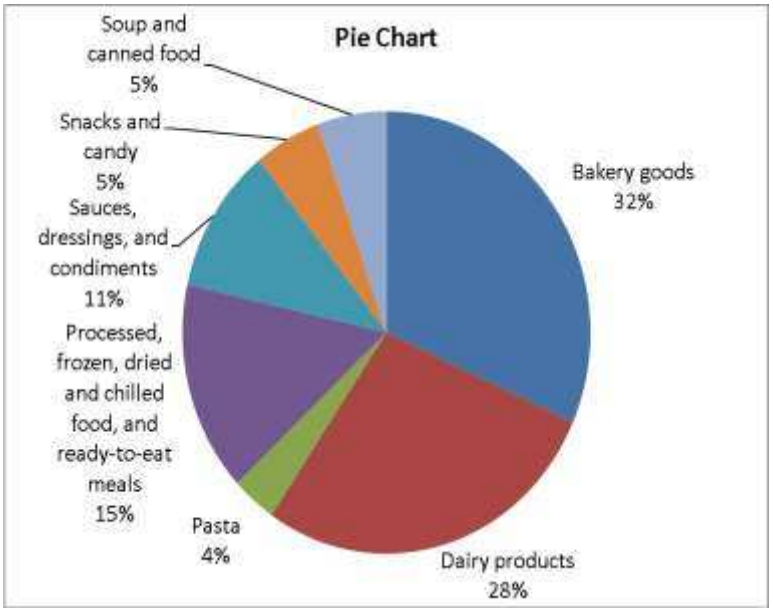
2.93 (b)
cont.

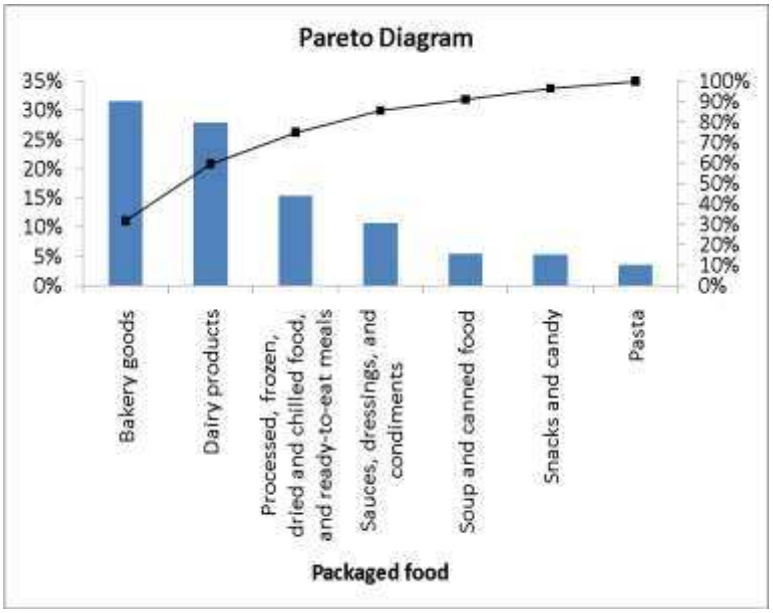


Russian Packaged Food Consumed:



2.93 cont. (b)

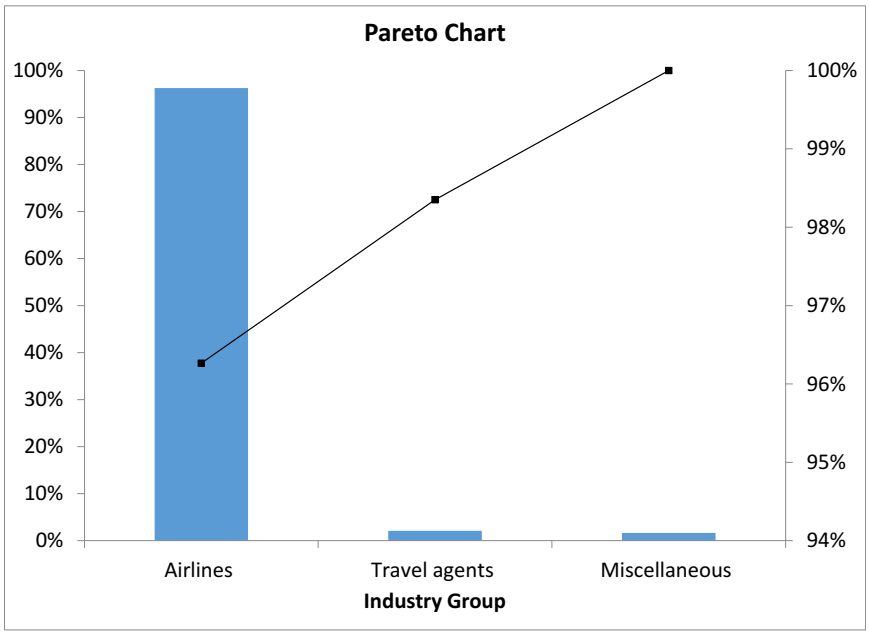




(c) The fresh food consumption patterns between Japanese and Russians are quite similar with vegetables taking up the largest share followed by meats and seafood while Americans consume about the same amount of meats and seafood, and vegetables. Among the three countries, vegetables, and meats and seafood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

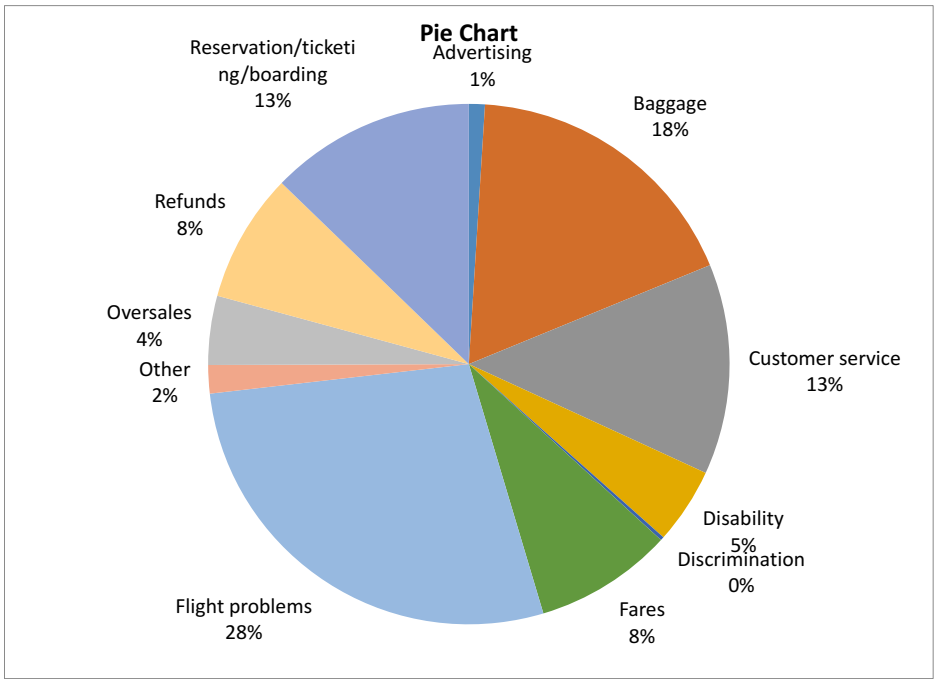
For Americans, dairy products, and processed, frozen, dried and chilled food and ready-to-eat meals make up slightly more than 60% of the packaged food consumption. For Japanese, processed, frozen, dried and chilled food, and ready-to-eat meals, and dairy products constitute more than 60% of their packaged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

2.94 (a)

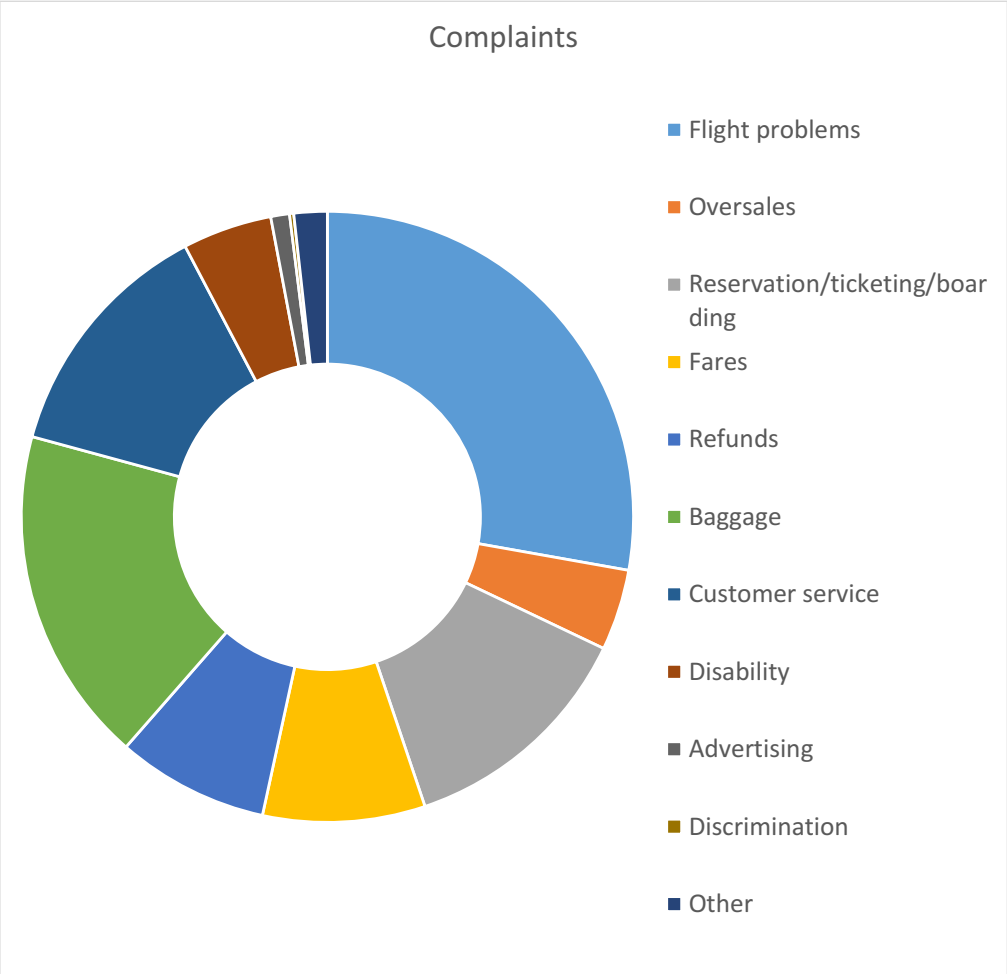


The airline industry accounts for most of the complaints.

(b)



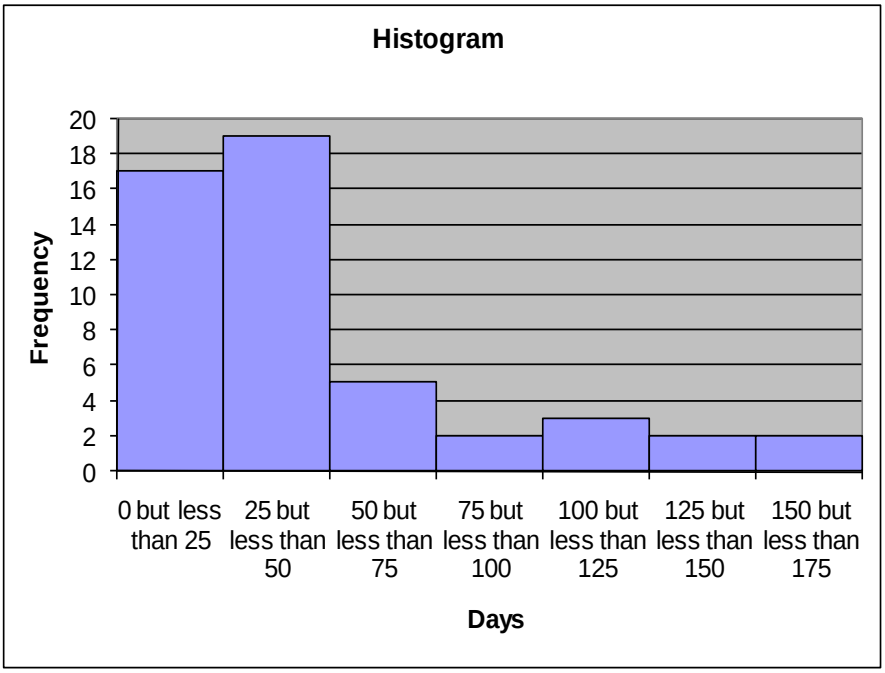
2.94 cont. (b)

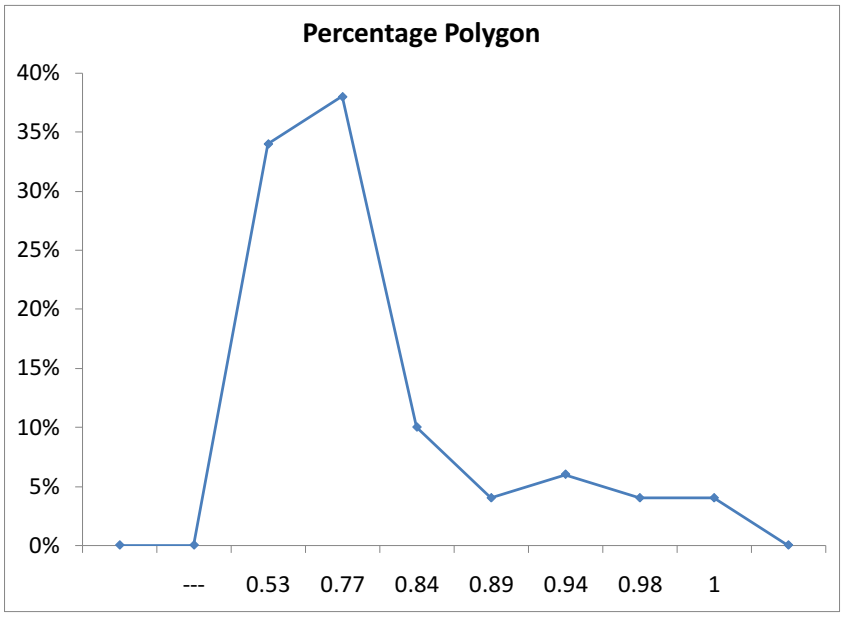


2.95 (a)

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%

2.95 cont. (b)

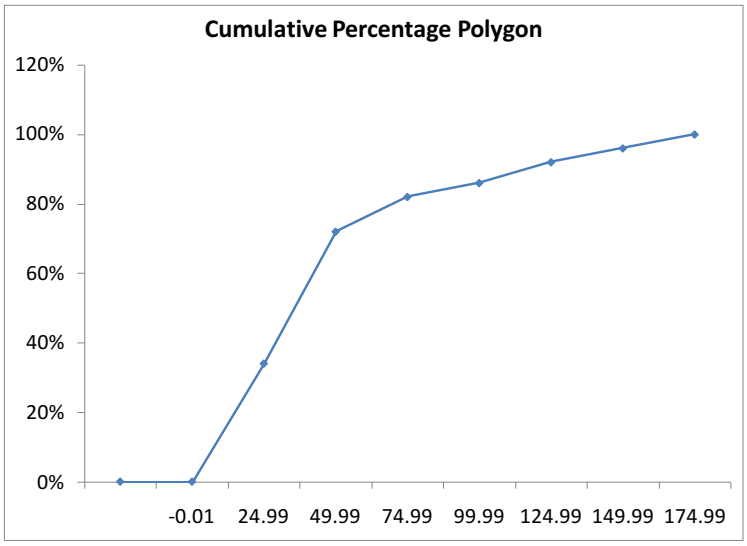

Histogram
Frequency
20
18
16
14
12
10
8
6
4
2
0
0 but less than 25
25 but less than 50
50 but less than 75
75 but less than 100
100 but less than 125
125 but less than 150
150 but less than 175
Days


Percentage Polygon
40%
35%
30%
25%
20%
15%
10%
5%
0%

0.53
0.77
0.84
0.89
0.94
0.98
1

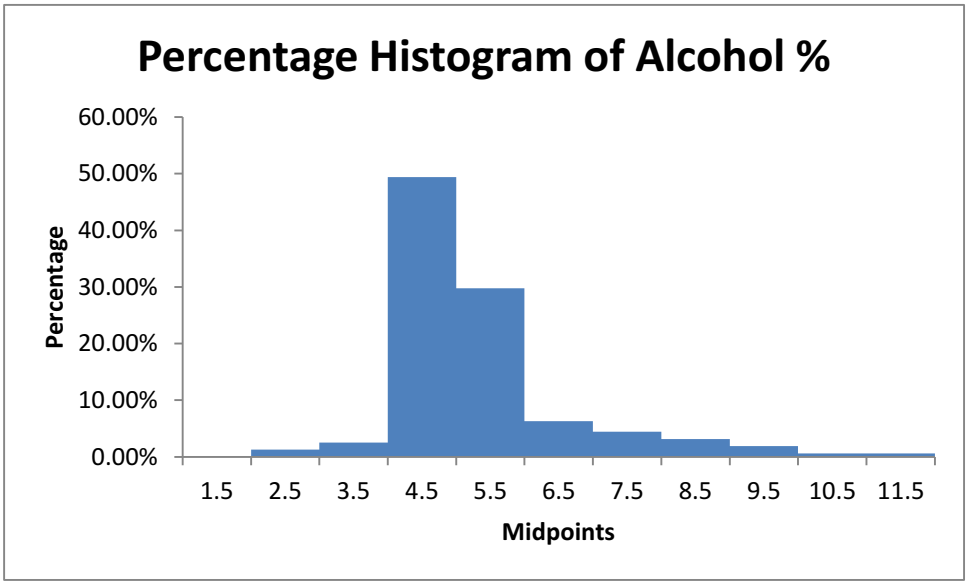
2.95 (c)
cont.

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%

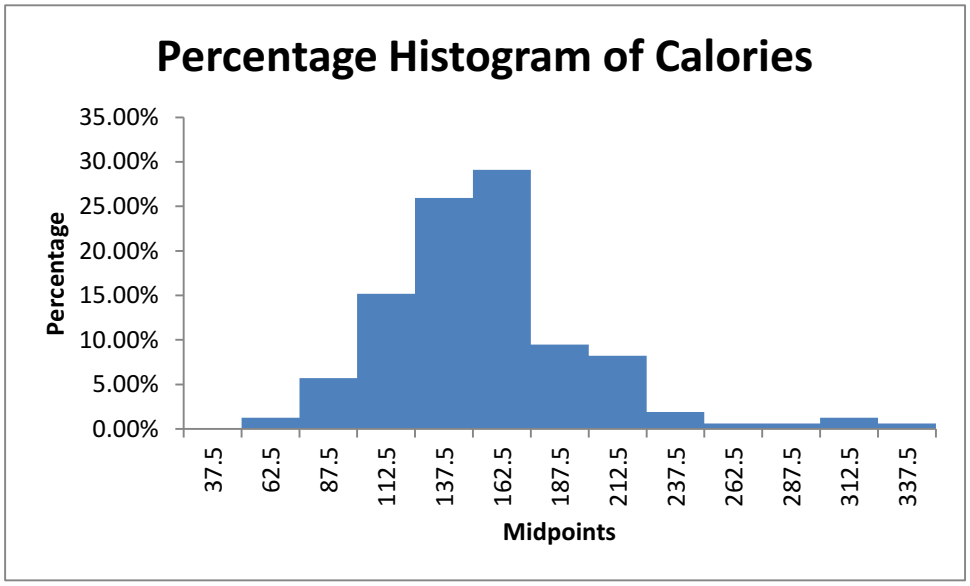


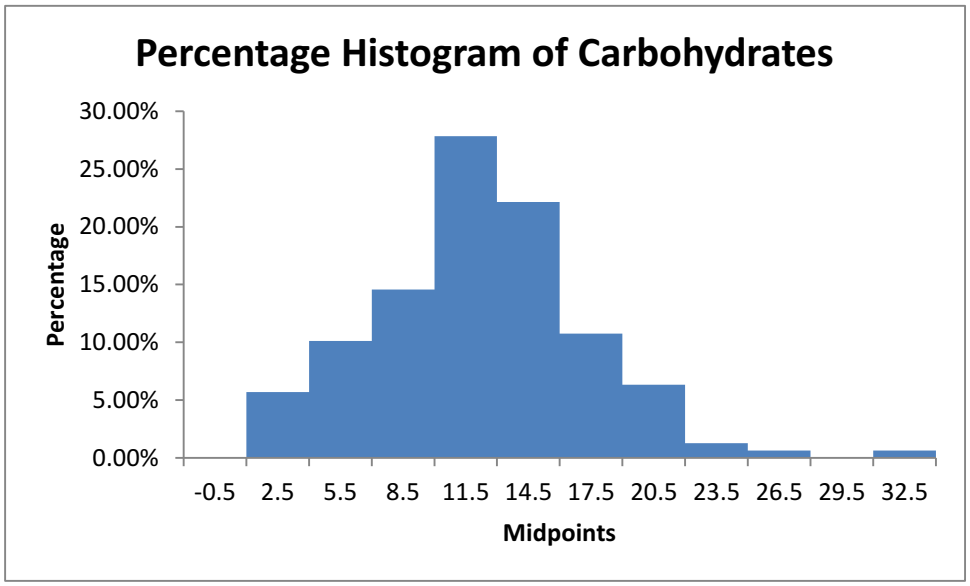
(d) You should tell the president of the company that over half of the complaints are resolved within a month, but point out that some complaints take as long as three or four months to settle.

2.96 (a)



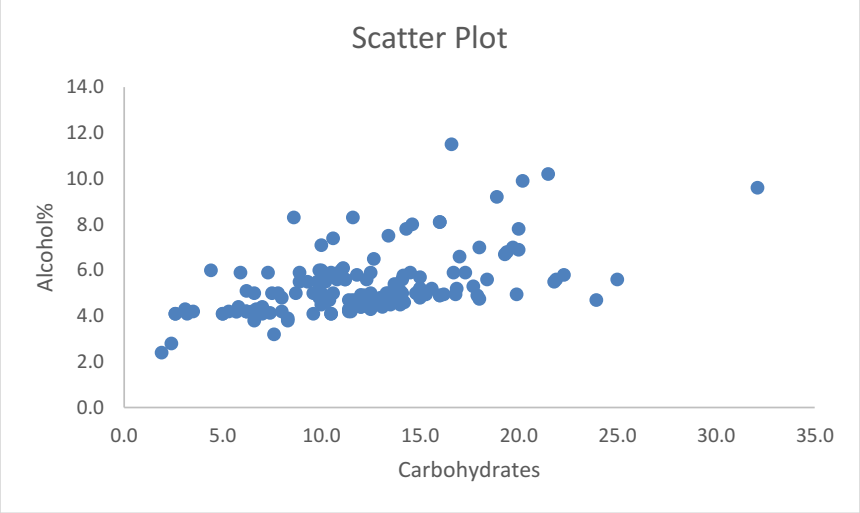
2.96 cont. (a)

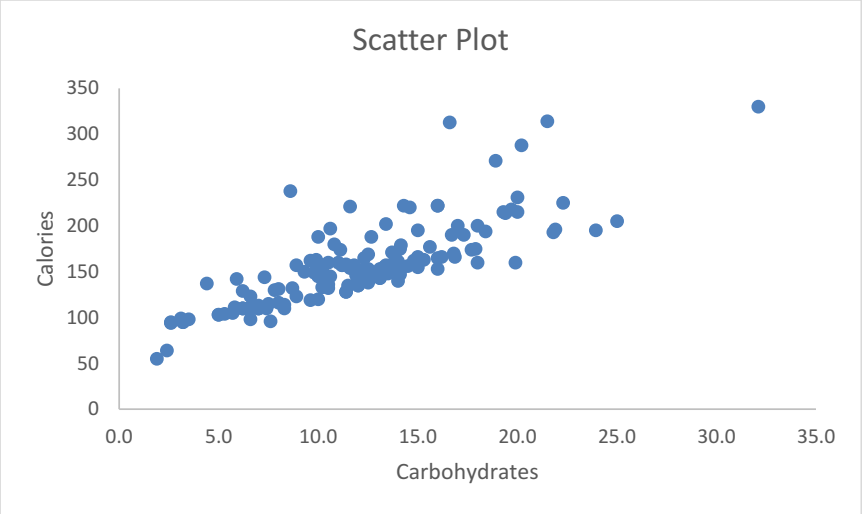

Percentage Histogram of Calories
35.00%
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
Percentage
37.5
62.5
87.5
112.5
137.5
162.5
187.5
212.5
237.5
262.5
287.5
312.5
337.5
Midpoints


Percentage Histogram of Carbohydrates
30.00%
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
Percentage
-0.5
2.5
5.5
8.5
11.5
14.5
17.5
20.5
23.5
26.5
29.5
32.5
Midpoints

2.96 (b) cont.


Scatter Plot
Alcohol%
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
0
50
100
150
200
250
300
350
Calories


Scatter Plot
Alcohol%
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
Carbohydrates

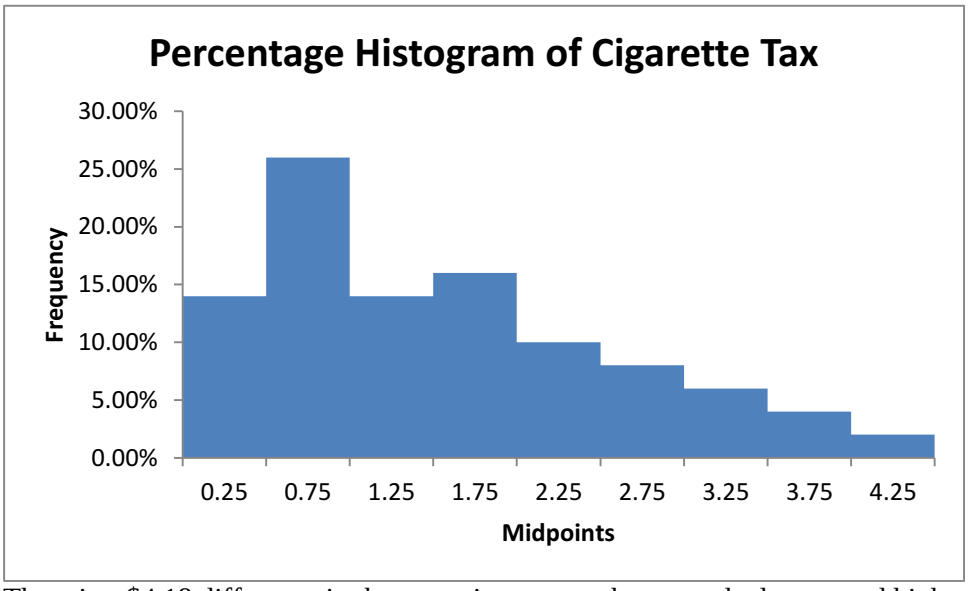

Scatter Plot
Calories
350
300
250
200
150
100
50
0
0.0
5.0
10.0
15.0
20.0
25.0
30.0
35.0
Carbohydrates

2.96 (c) The alcohol % is concentrated between 4 and 6, with more between 4 and 5. The calories are concentrated between 125 and 175. The carbohydrates are concentrated between 10 and 16. There are outliers in the percentage of alcohol in both tails. There are a few beers with alcohol content as high as around 11%. There are a few beers with calories content higher than 250 and carbohydrates higher than 31.
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.

2.97 (a) Ordered array:

Cigarette Tax	0.170	0.300	0.360	0.370	0.425	0.440	0.450	0.550	0.570	0.570
	0.600	0.600	0.620	0.640	0.680	0.790	0.800	0.840	0.870	0.995
	1.030	1.150	1.250	1.310	1.339	1.360	1.410	1.530	1.600	1.600
	1.660	1.700	1.700	1.780	1.980	2.000	2.000	2.000	2.000	2.000
	2.520	2.700	2.750	2.900	3.025	3.200	3.400	3.500	3.510	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 $4.00. Majority of the states though have cigarette tax concentrated around $0.75.

2.98 (a) One-year CD:

Statistics	
Sample Size	25
Mean	0.8624
Median	0.9000
Std. Deviation	0.2893
Minimum	0.2300
Maximum	1.3400

Stem-and-Leaf Disp

Stem unit 0.1

2	3
3	
4	0 0
5	5 9
6	5
7	0 1 5
8	0 0 5
9	0 5 5
10	0 0 0 4 9
11	5 9
12	2
13	0 4

5-year CD

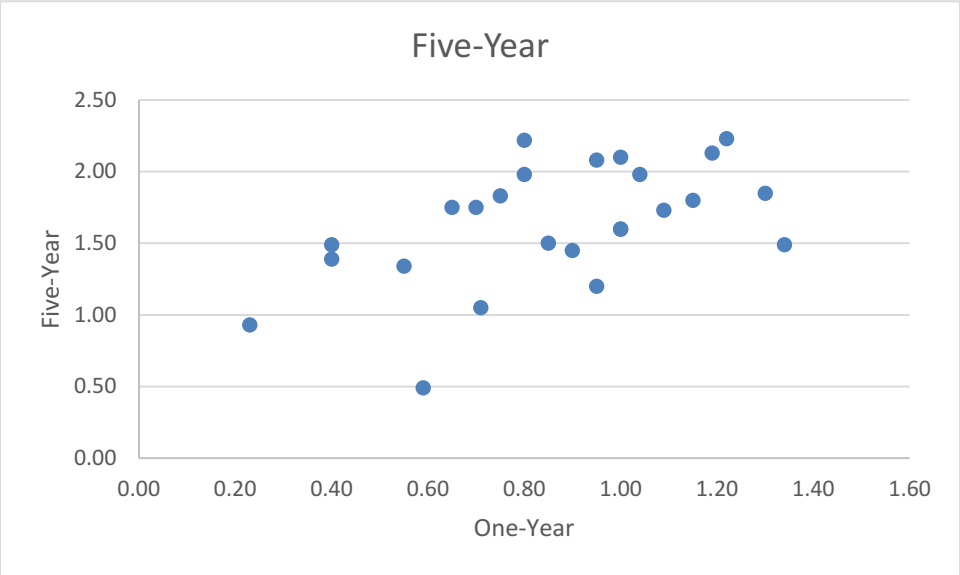
Statistics	
Sample Size	25
Mean	1.6384
Median	1.7300
Std. Deviation	0.4244
Minimum	0.4900
Maximum	2.2300

Stem-and-Leaf Display

Stem unit 0.1

4	9
5	
6	
7	
8	
9	3
10	5
11	
12	0
13	4 9
14	5 9 9
15	0
16	0 0
17	3 5 5
18	0 3 5
19	8 8
20	8
21	0 3
22	2 3

2.98 cont. (b)

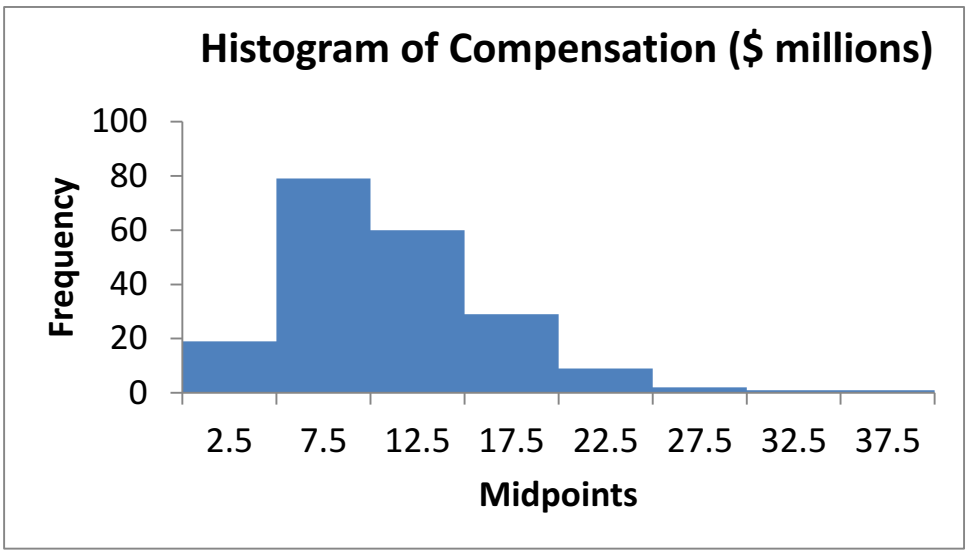


(c) There appears to be a positive relationship between the yield of the one-year CD and the five-year CD.

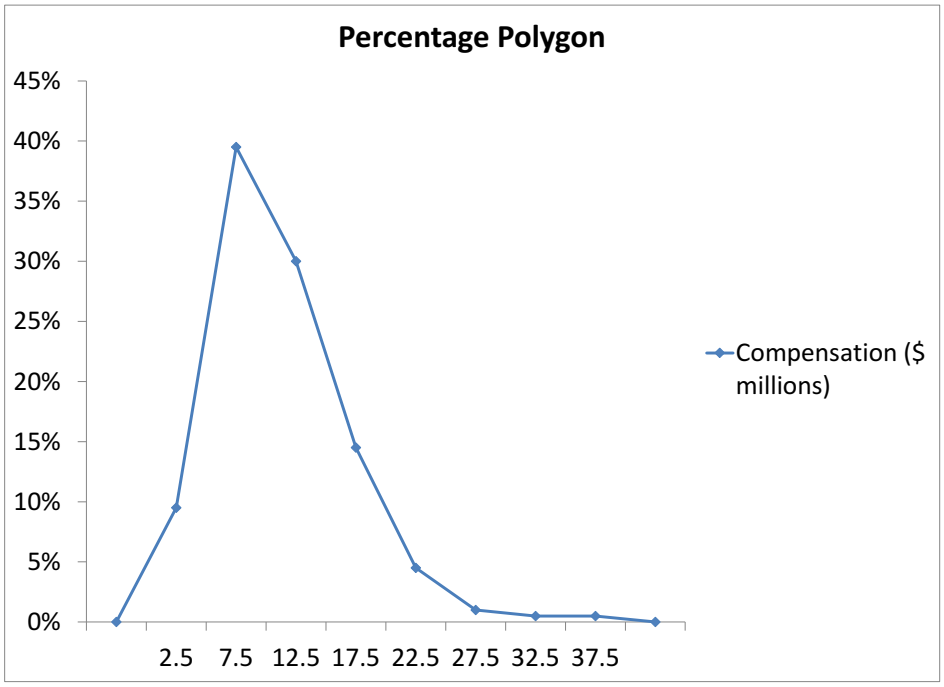
2.99 (a),(c)

bin	Frequency	Percentage
0 but less than 5	19	9.50%
5 but less than 10	79	39.50%
10 but less than 15	60	30.00%
15 but less than 20	29	14.50%
20 but less than 25	9	4.50%
25 but less than 30	2	1.00%
30 but less than 35	1	0.50%
35 but less than 40	1	0.50%

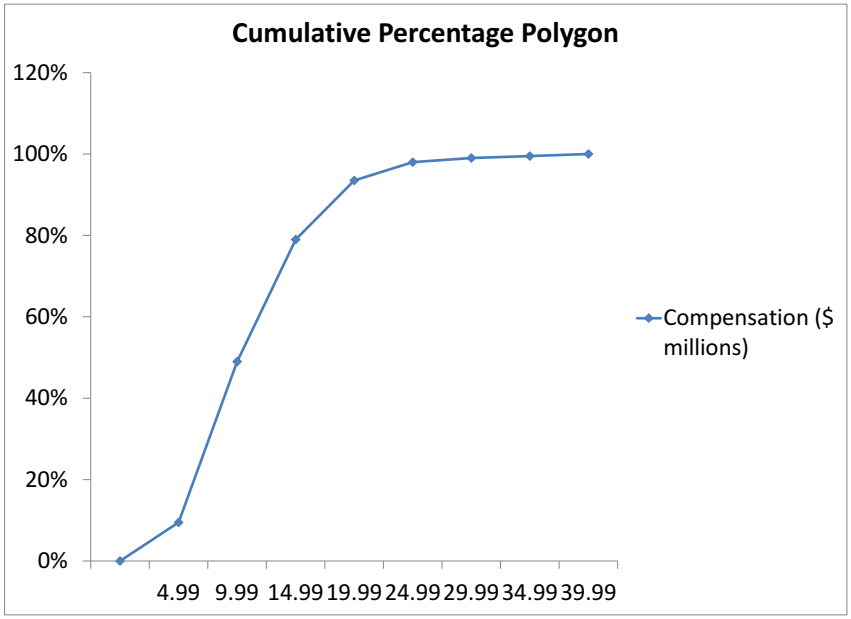
(b)



2.99 cont. (b)

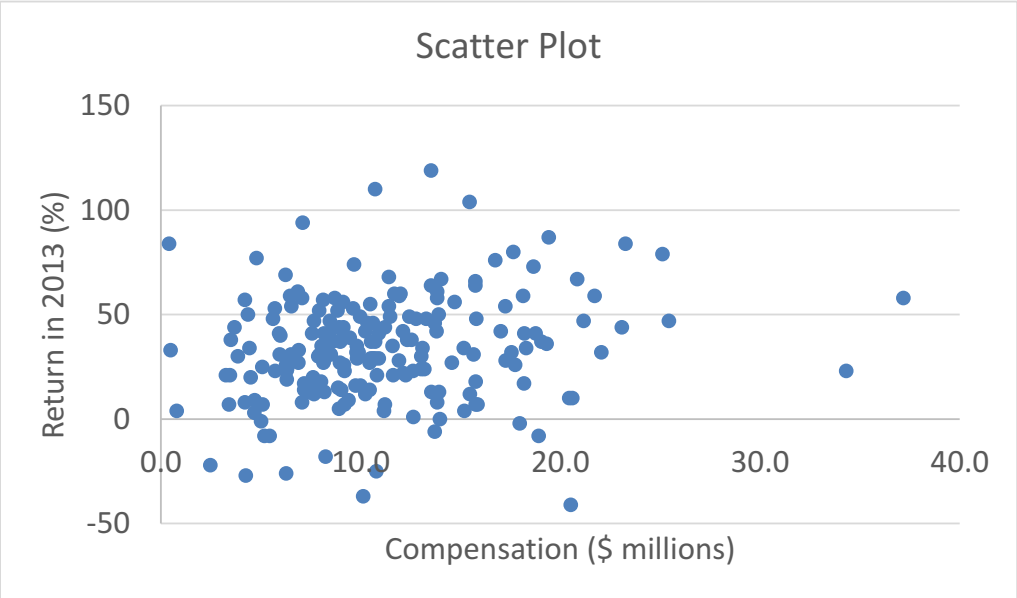


(c)



(d) CEO compensation in 2013 is right skewed. Slightly higher than 80% of the CEOs have compensation lower than $15,000,000

2.99 cont. (e)



(f) There is not any obvious relationship between the total compensation and investment return in 2013.

2.100 (a)

Frequencies (Boston)

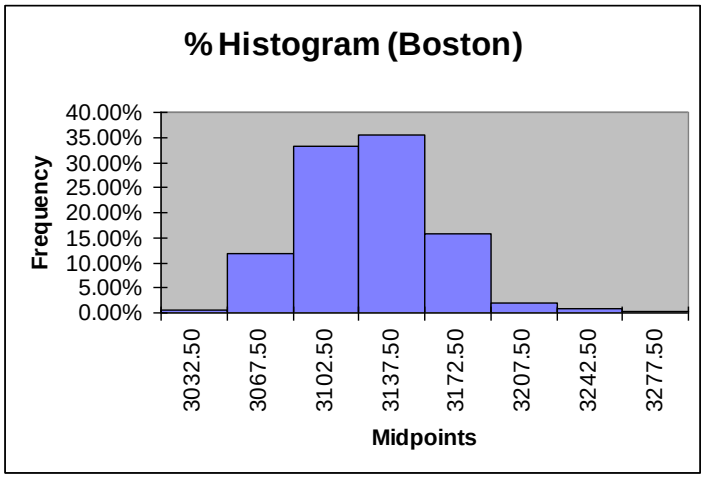
Weight (Boston)	*Frequency*	*Percentage*
3015 but less than 3050	2	0.54%
3050 but less than 3085	44	11.96%
3085 but less than 3120	122	33.15%
3120 but less than 3155	131	35.60%
3155 but less than 3190	58	15.76%
3190 but less than 3225	7	1.90%
3225 but less than 3260	3	0.82%
3260 but less than 3295	1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

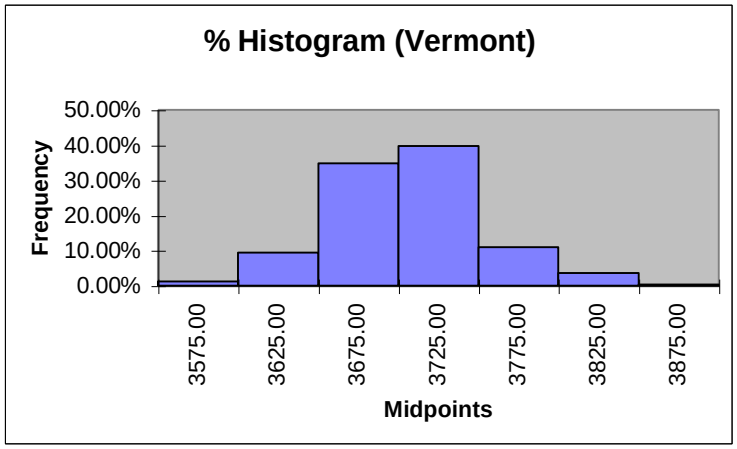
(b)

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%

2.100 (c)
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.

2.101 (a),(c) **Two-star:**

	Average price		Frequency	Percentage	Cumulative Pctage.
10	but less than	20	1	2.44%	2.44%
20	but less than	30	1	2.44%	4.88%
30	but less than	40	5	12.20%	17.07%
40	but less than	50	8	19.51%	36.59%
50	but less than	60	4	9.76%	46.34%
60	but less than	70	8	19.51%	65.85%
70	but less than	80	7	17.07%	82.93%
80	but less than	90	4	9.76%	92.68%
90	but less than	100	2	4.88%	97.56%
100	but less than	110	1	2.44%	100.00%

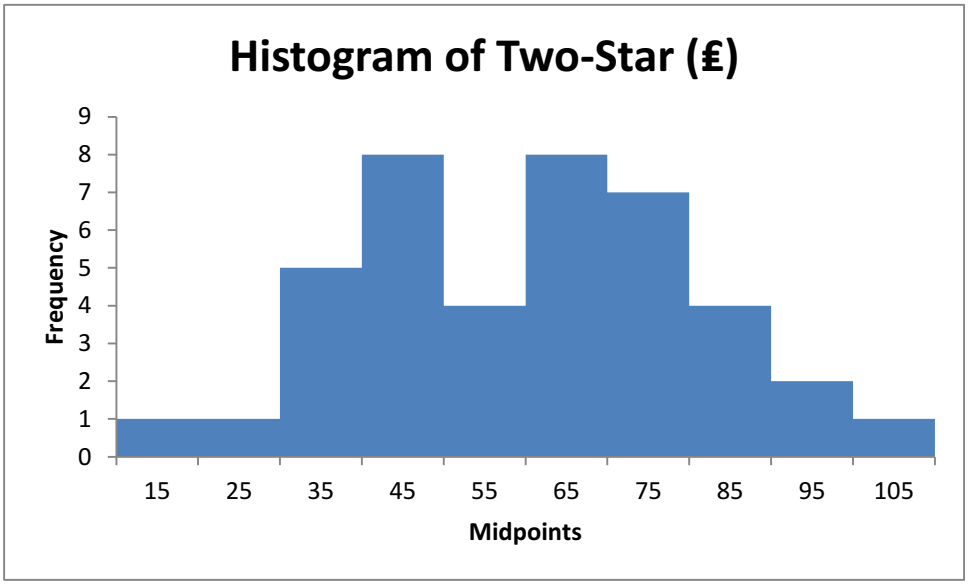
2.101 cont. (a),(c) **Three-star:**

	Average price		Frequency	Percentage	Cumulative Pctage.
25	but less than	40	1	2.44%	2.44%
40	but less than	55	5	12.20%	14.63%
55	but less than	70	4	9.76%	24.39%
70	but less than	85	9	21.95%	46.34%
85	but less than	100	11	26.83%	73.17%
100	but less than	115	5	12.20%	85.37%
115	but less than	130	3	7.32%	92.68%
130	but less than	145	1	2.44%	95.12%
145	but less than	160	2	4.88%	100.00%

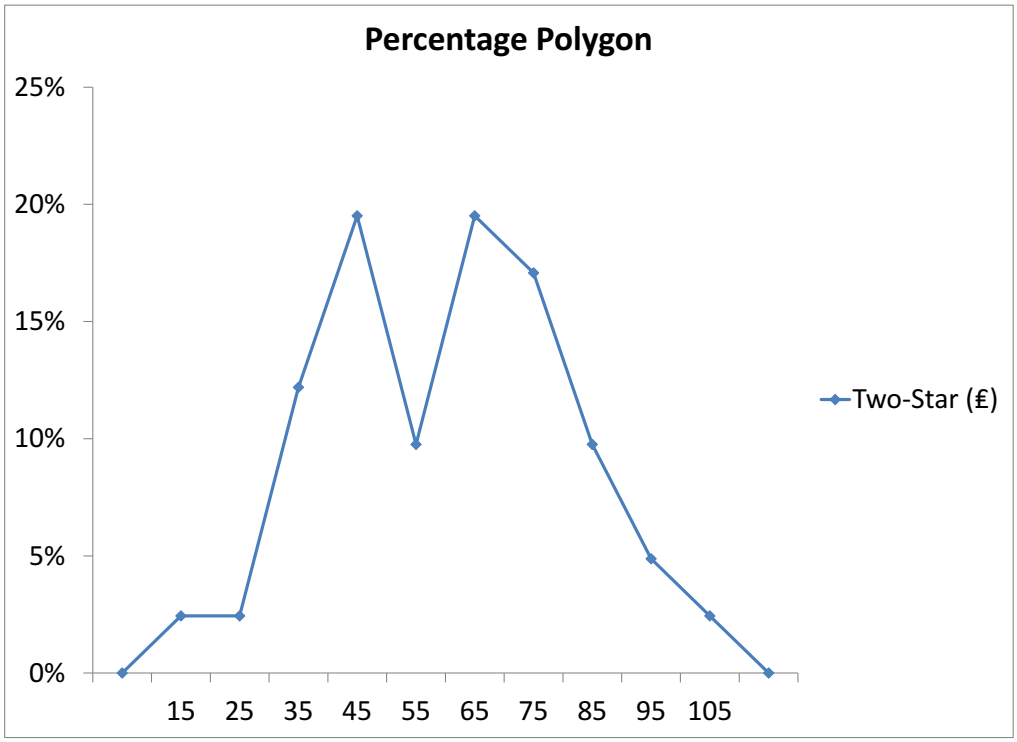
Four-star:

	Average price		Frequency	Percentage	Cumulative Pctage.
0	but less than	20	1	2.44%	2.44%
20	but less than	40	0	0.00%	2.44%
40	but less than	60	1	2.44%	4.88%
60	but less than	80	7	17.07%	21.95%
80	but less than	100	4	9.76%	31.71%
100	but less than	120	9	21.95%	53.66%
120	but less than	140	7	17.07%	70.73%
140	but less than	160	5	12.20%	82.93%
160	but less than	180	1	2.44%	85.37%
180	but less than	200	5	12.20%	97.56%
200	but less than	220	1	2.44%	100.00%

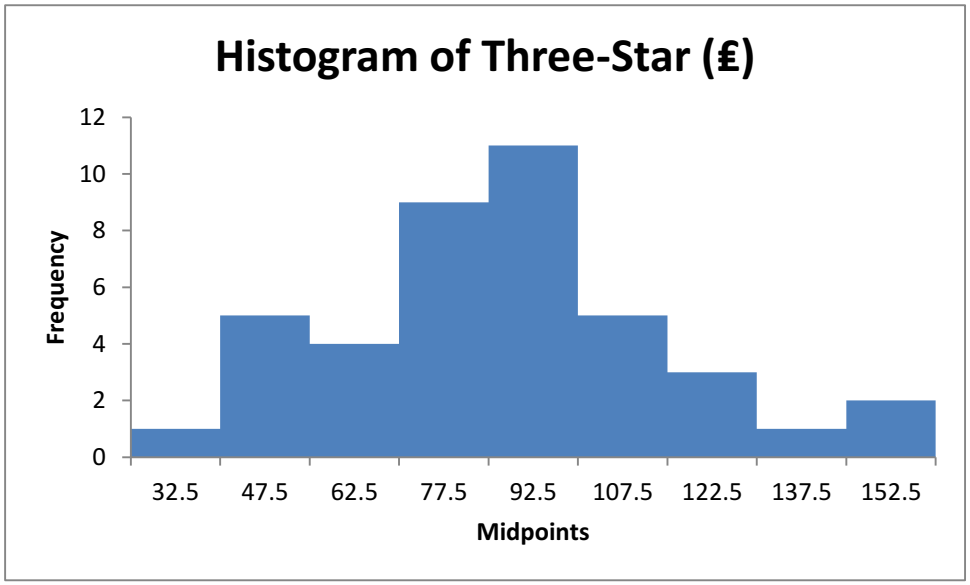
(b) **Two-star:**



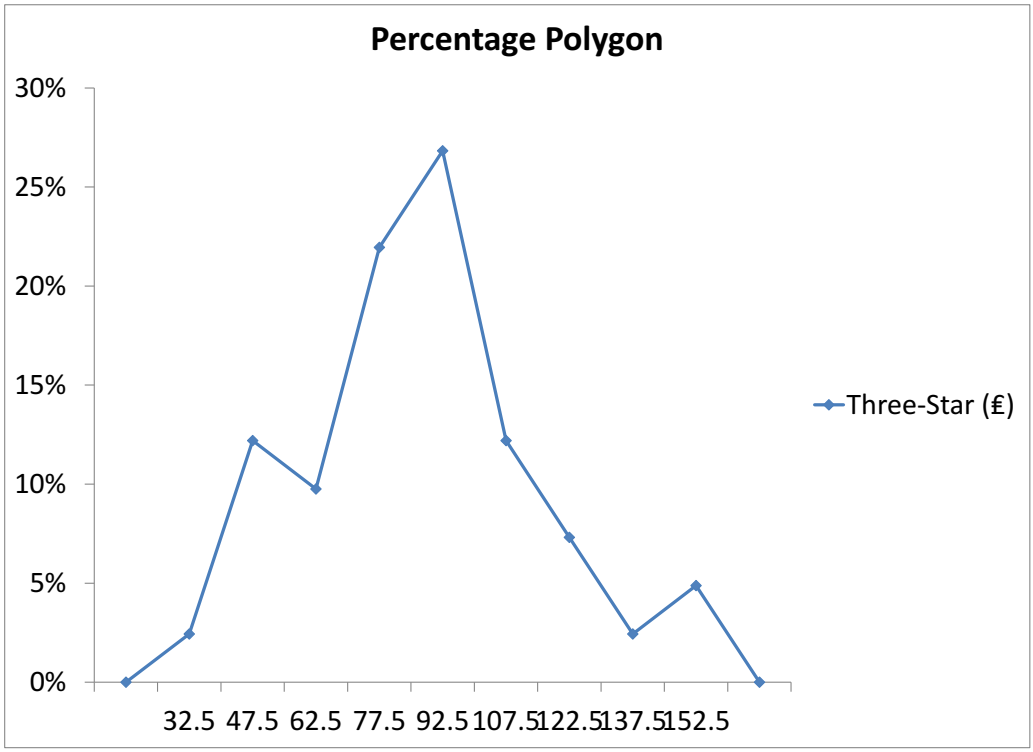
2.101 (b) cont.



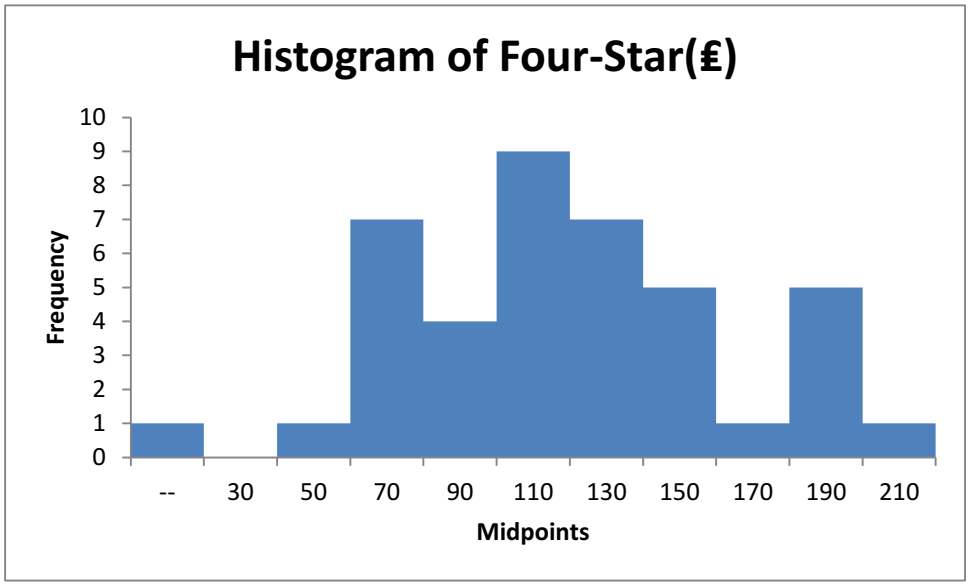
Three-star:



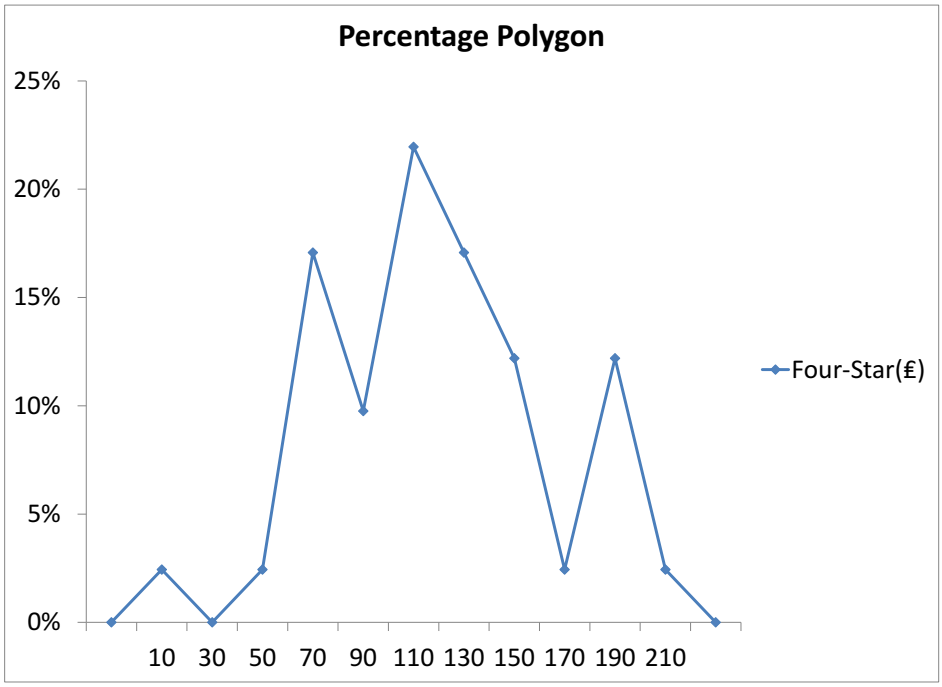
2.101 (b) cont.



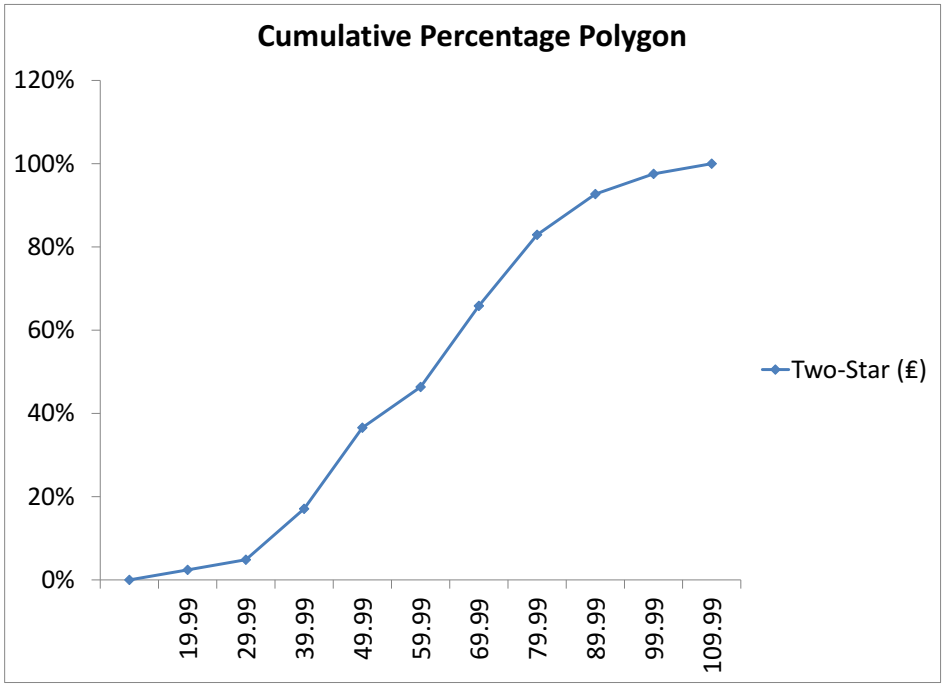
Four-star:



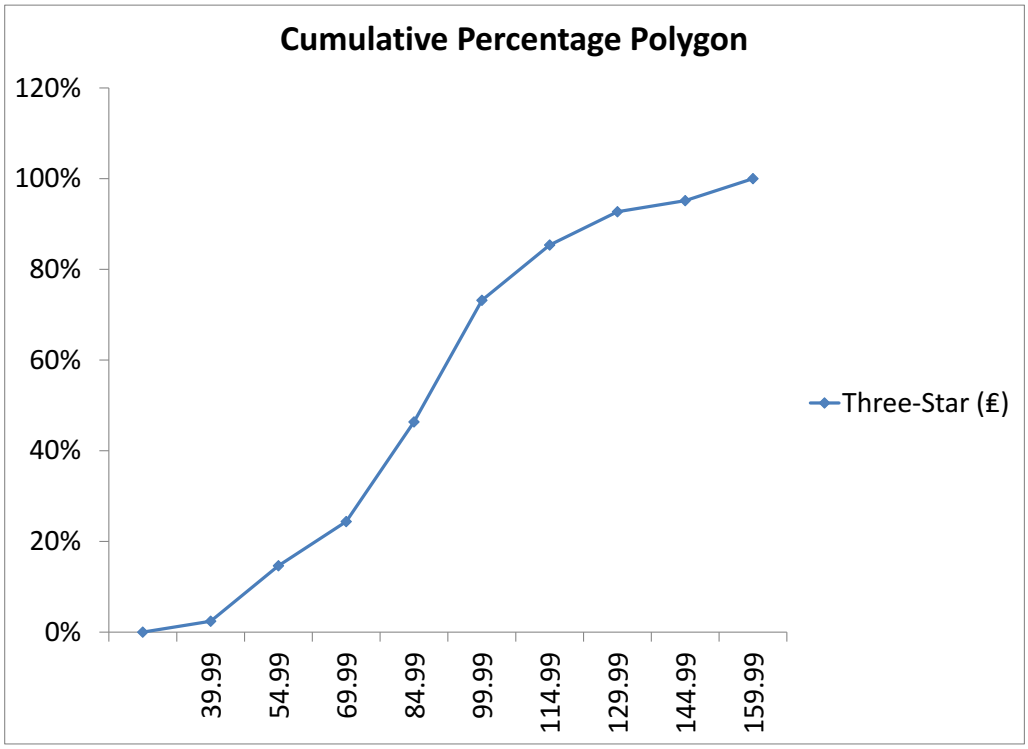
2.101 (b) cont.



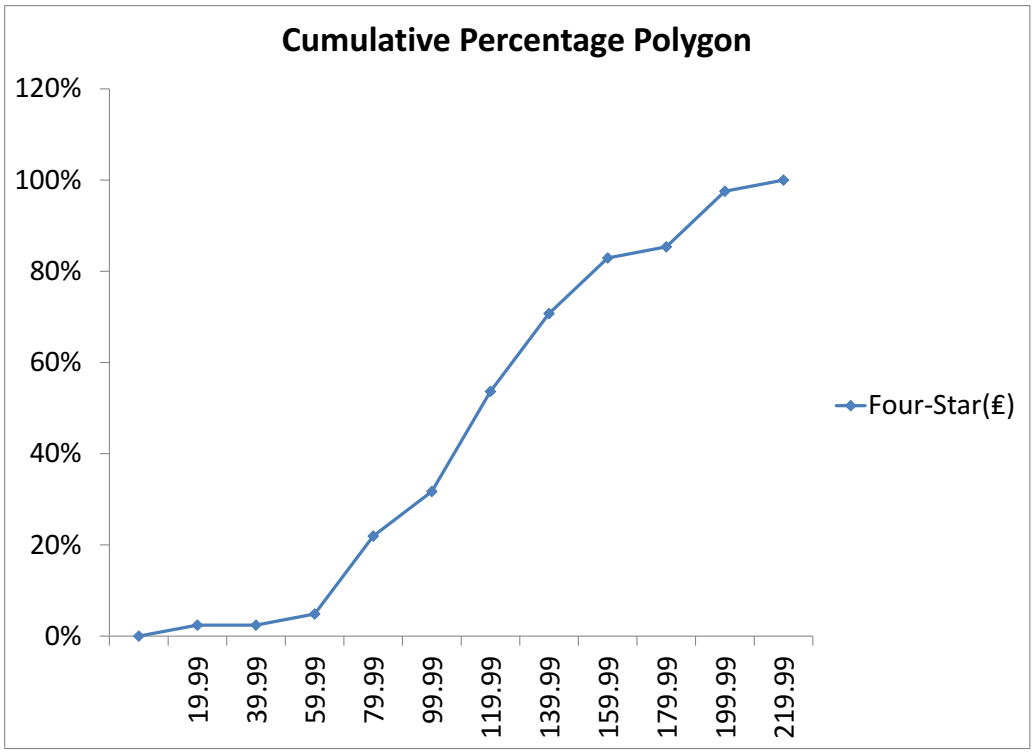
(c) **Two-star:**



2.101 cont. (c) **Three-star:**

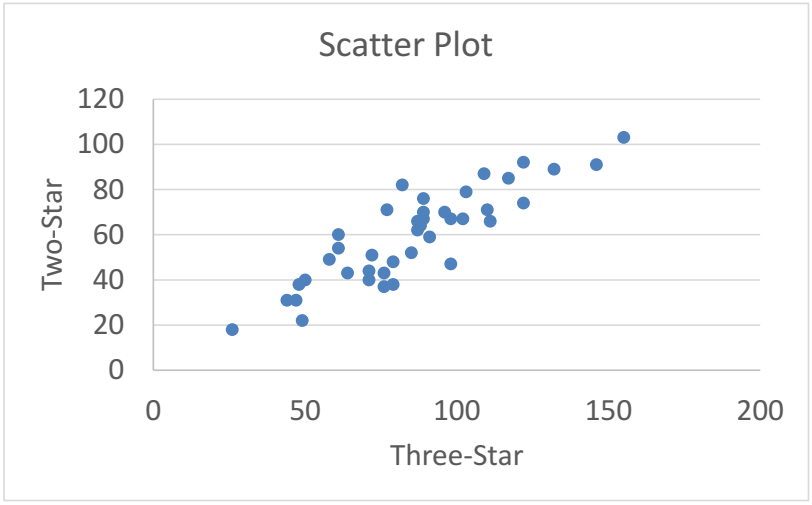


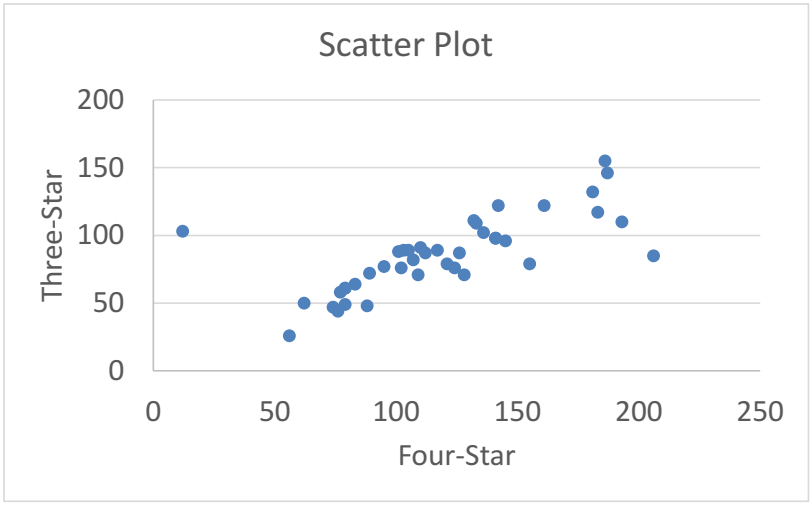
Four-star:

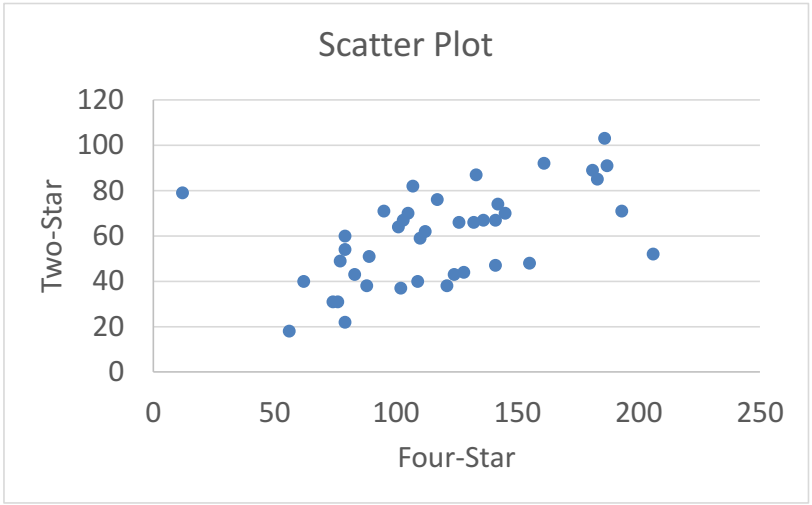


(d) The price of two-star and four-star hotels are slightly left-skewed while that of three-star isslight right-skewed. The median price of two-star , three-star and four-star hotels is around 65, 92.5, and 110 English pounds, respectively.

2.101 cont. (e)



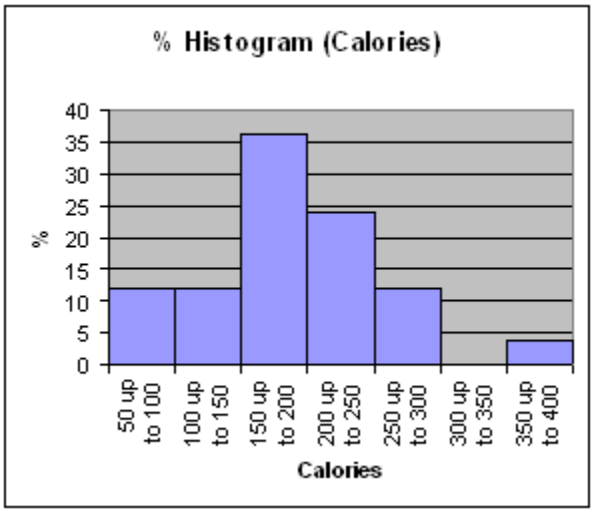




(f) The relationship of the price between two-star and three-star, three-star and four-star, and two-star and four-star hotels are all positve.

2.102 (a)

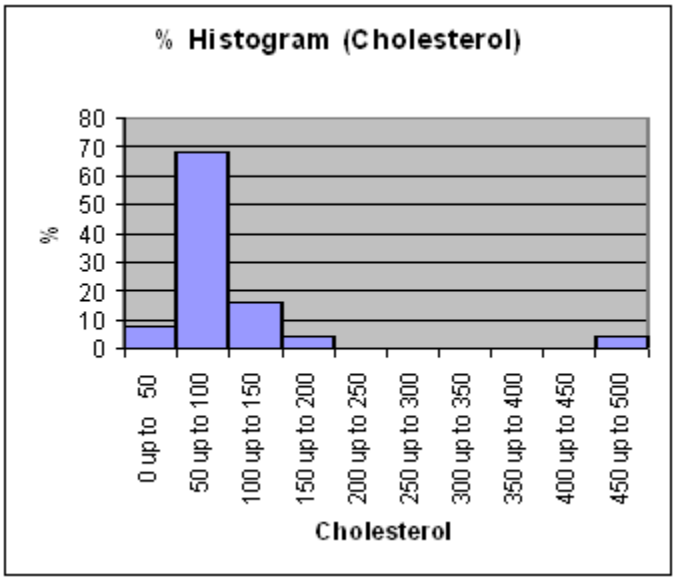
Calories	Frequency	Percentage	Percentage Less Than
50 up to 100	3	12%	12%
100 up to 150	3	12	24
150 up to 200	9	36	60
200 up to 250	6	24	84
250 up to 300	3	12	96
300 up to 350	0	0	96
350 up to 400	1	4	100



(b)

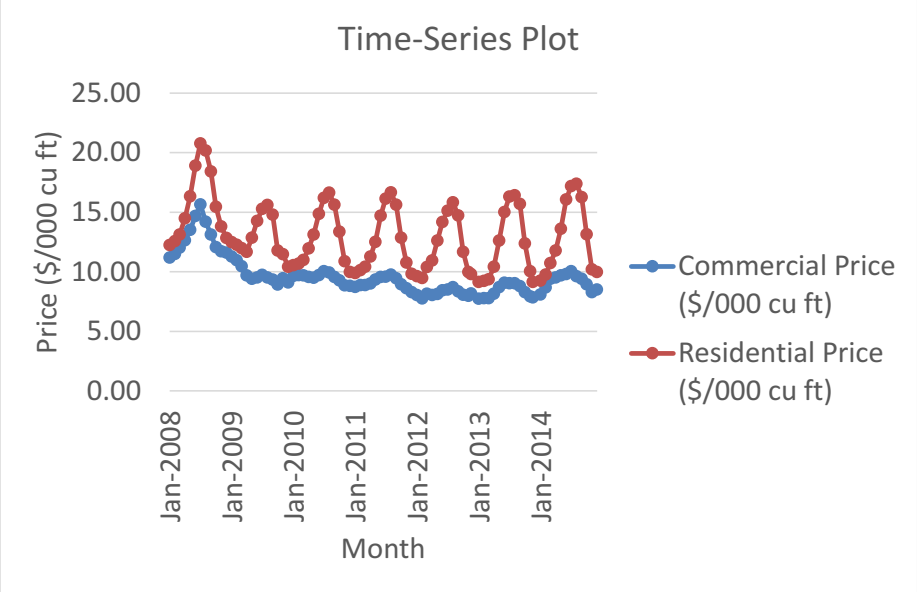
Cholesterol	Frequency	Percentage	Percentage Less Than
0 up to 50	2	8	8%
50 up to 100	17	68	76
100 up to 150	4	16	92
150 up to 200	1	4	96
200 up to 250	0	0	96
250 up to 300	0	0	96
300 up to 350	0	0	96
350 up to 400	0	0	96
400 up to 450	0	0	96
450 up to 500	1	4	100

2.102 (b) cont.



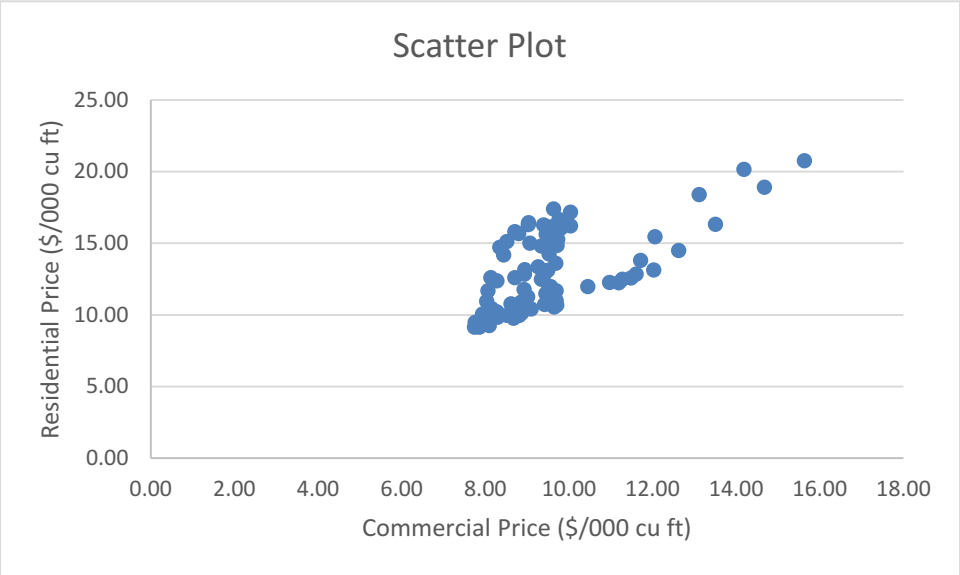
(c) The sampled fresh red meats, poultry, and fish vary from 98 to 397 calories per serving, with the highest concentration between 150 to 200 calories. One protein source, spareribs, with 397 calories, is more than 100 calories above the next highest caloric food. The protein content of the sampled 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.

2.103 (a)



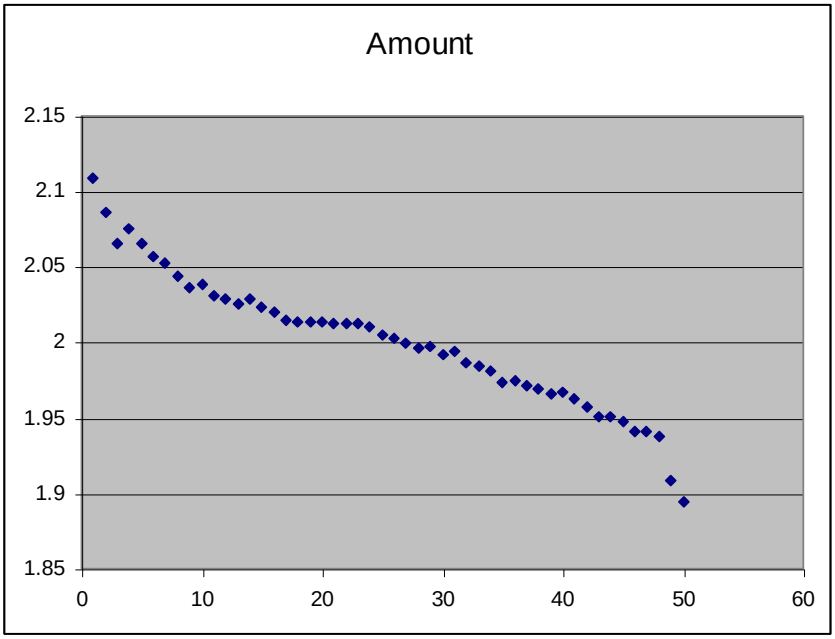
(b) The commercial average price was highest in the summer of 2008 and had since declined. The residential average price of gasoline in the United States is higher in the summer in general and seems to peak in June.

2.103 (c) cont.



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

2.104 (a)

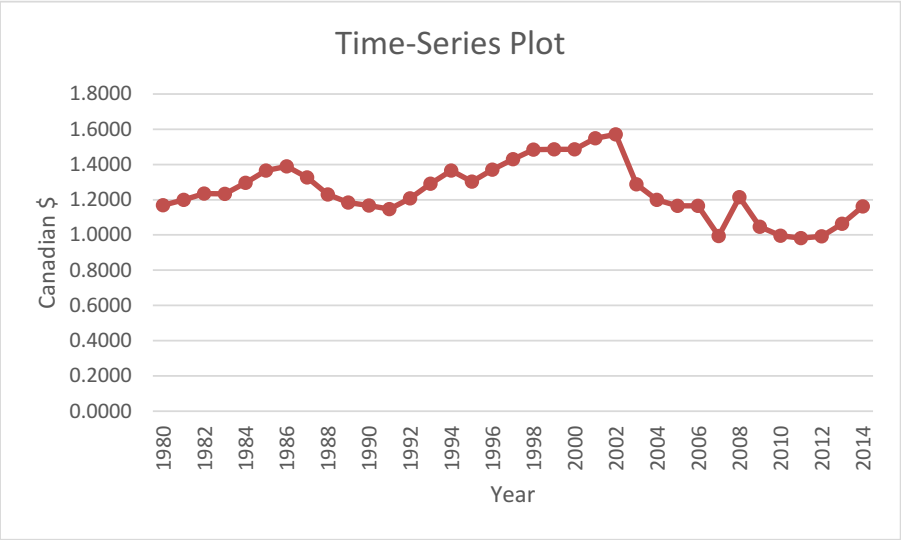


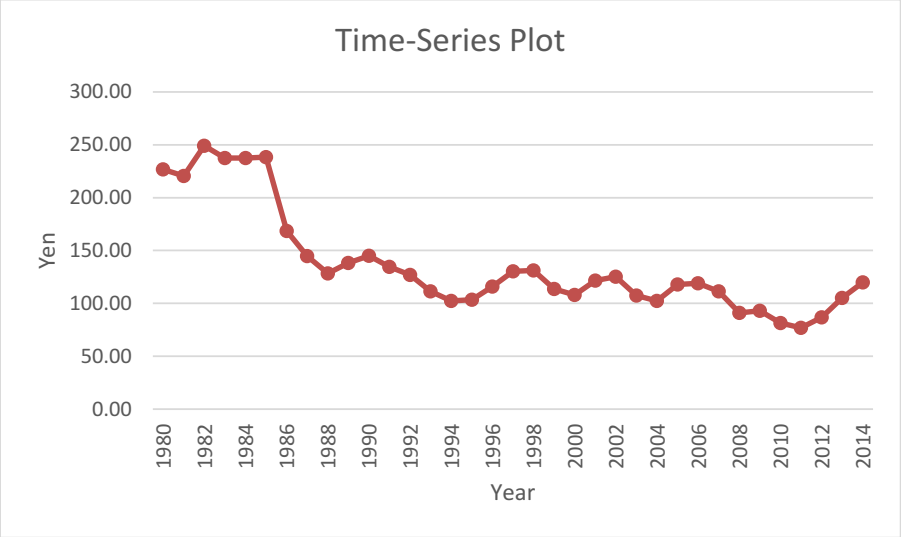
(b) There is a downward trend in the amount filled.

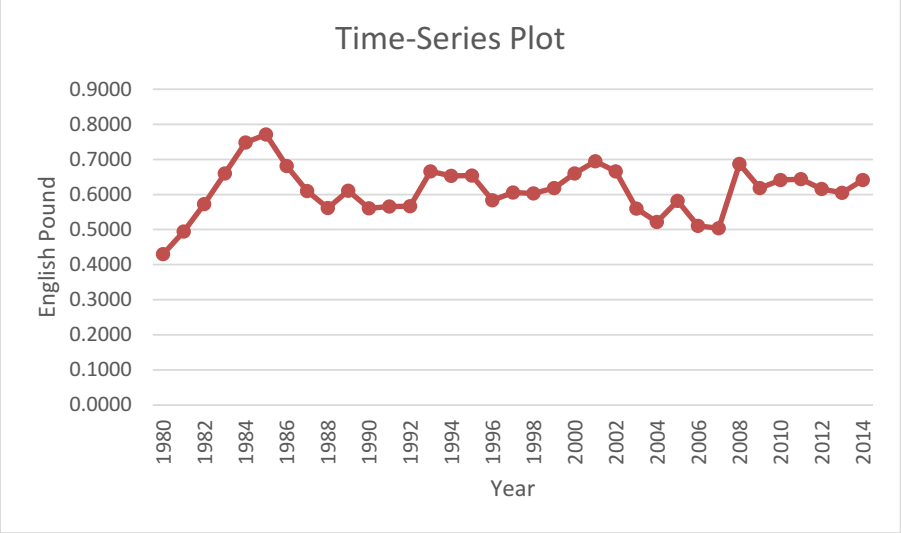
(c) The amount filled in the next bottle will most likely be below 1.894 liter.

(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.

2.105 (a)


Time-Series Plot
Canadian $
1.8000
1.6000
1.4000
1.2000
1.0000
0.8000
0.6000
0.4000
0.2000
0.0000
1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014
Year


Time-Series Plot
Yen
300.00
250.00
200.00
150.00
100.00
50.00
0.00
1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014
Year

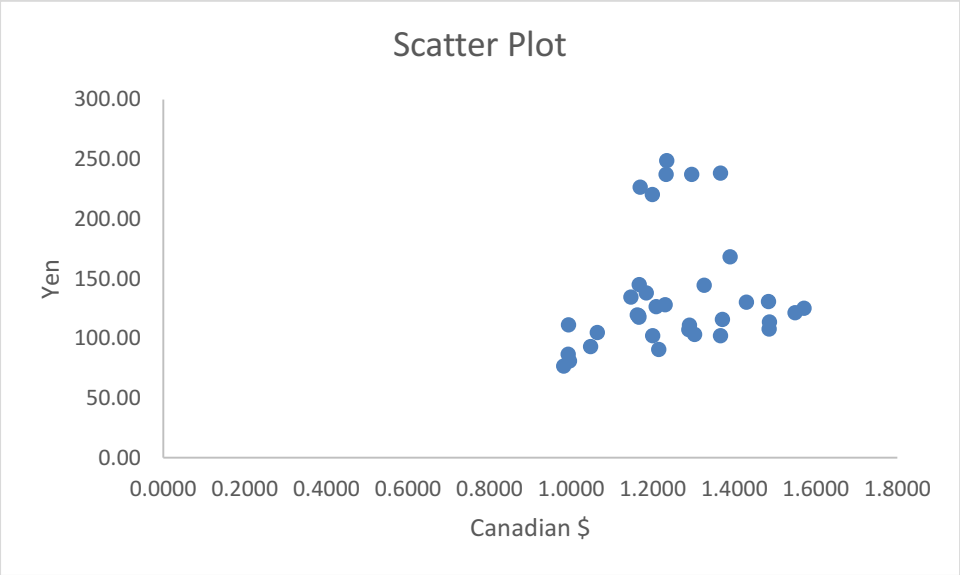

Time-Series Plot
English Pound
0.9000
0.8000
0.7000
0.6000
0.5000
0.4000
0.3000
0.2000
0.1000
0.0000
1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014
Year

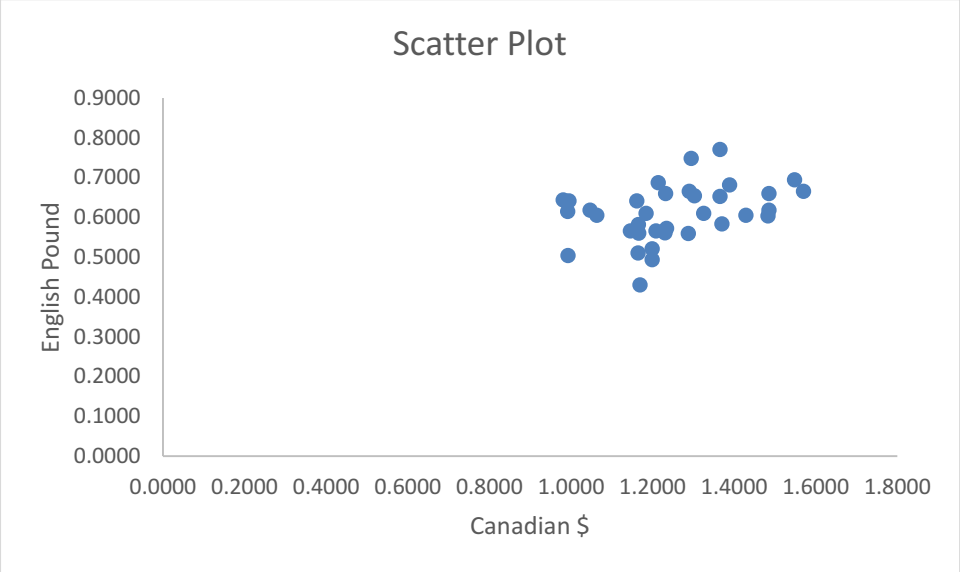
2.105 cont.

(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.

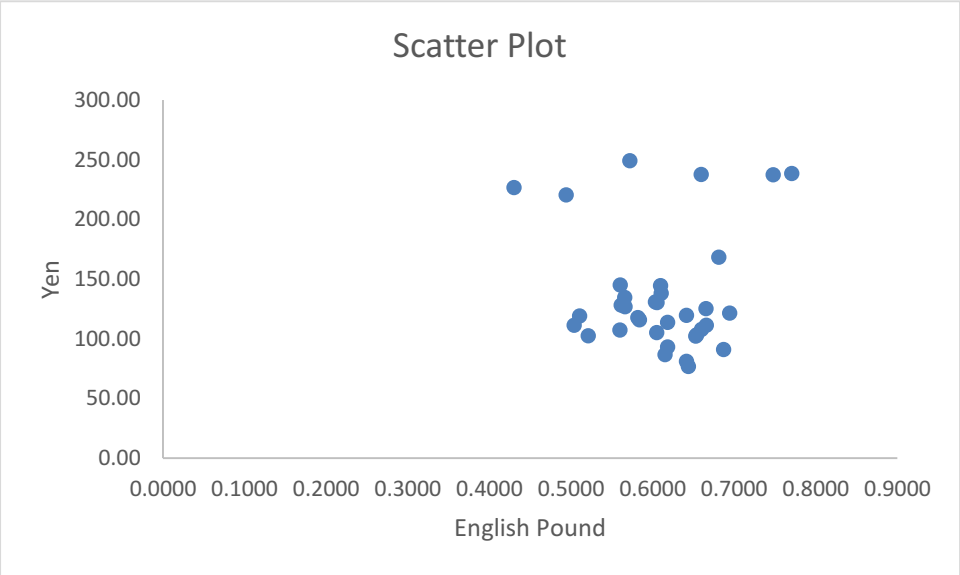
(c) The U.S. dollar has appreciated against the Japanese yen since 1980 and appreciated against the Canadian dollar since 2002 in general while the exchange rate against the English bound has been stable in general.

(d)





2.105 (d) cont.

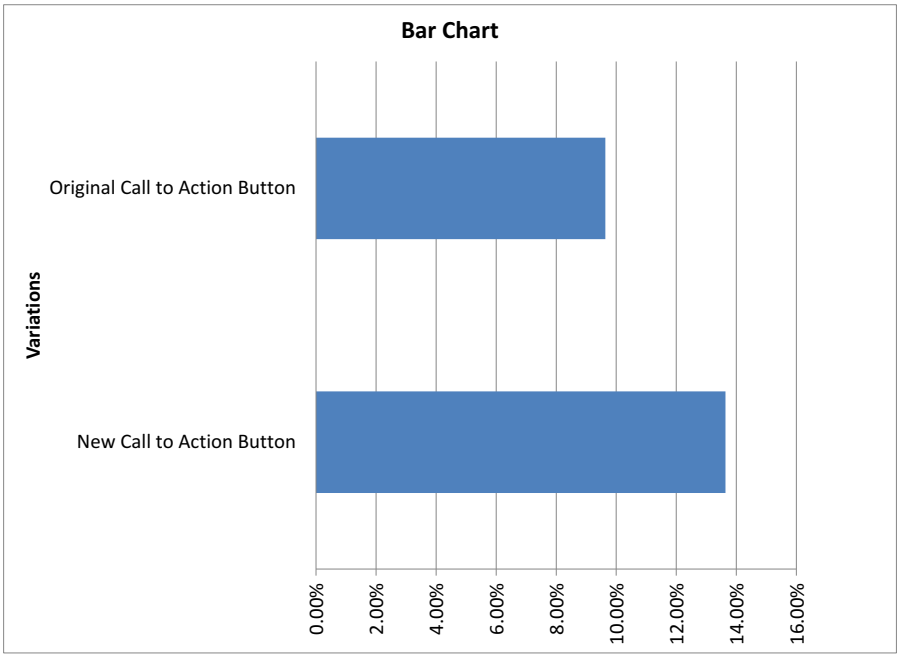


(e) There is not any obvious relationship between the Canadian dollar and Japanese yen in terms of the U.S. dollar nor any relationship between the Japanese yen and English pound. There is a slightly positive relationship between the Canadian dollar and English pound which reflects the fact that when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

2.106 (a)

Variations	Percentage of Download
Original Call to Action Button	9.64%
New Call to Action Button	13.64%

(b)

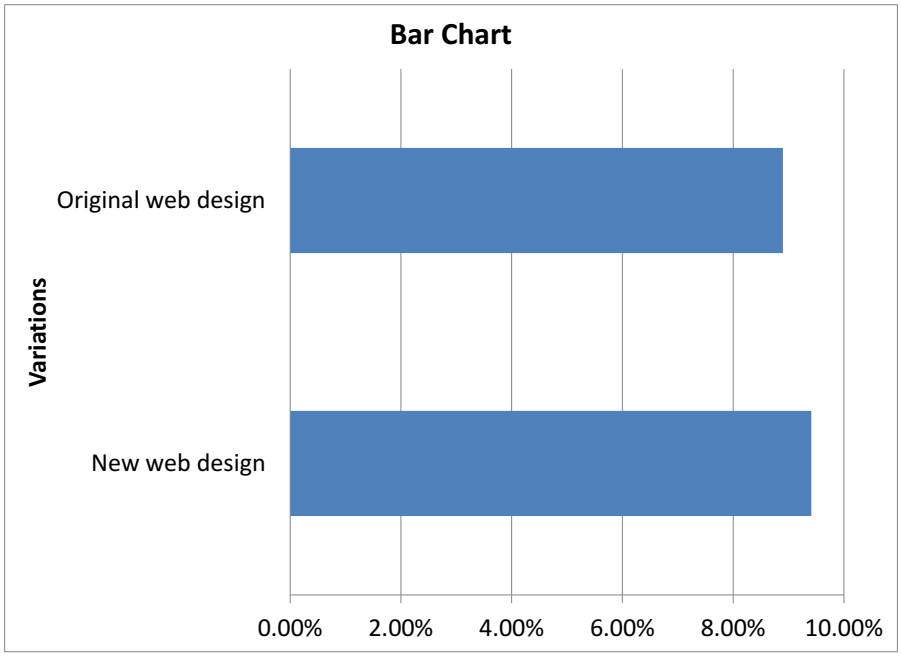


2.106 cont. (c) The New Call to Action Button has a higher percentage of downloads at 13.64% when compared to the Original Call to Action Button with a 9.64% of downloads.

(d)

Variations	Percentage of Downloads
Original web design	8.90%
New web design	9.41%

(e)



(f) The New web design has only a slightly higher percentage of downloads at 9.41% when compared to the Original web design with an 8.90% of downloads.

(g) The New web design is only slightly more successful than the Original web design while the New Call to Action Button is much more successful than the Original Call to Action Button with about 41% higher percentage of downloads.

(h)

Call to Action Button	Web Design	Percentage of Downloads
Old	Old	8.30%
New	Old	13.70%
Old	New	9.50%
New	New	17.00%

(i) The combination of the New Call to Action Button and the New web design results in slightly more than twice as high a percentage of downloads than the combination of the Old Call to Action Button and Old web design.

(j) The New web design is only slightly more successful than the Original web design while the New Call to Action Button is much more successful than the Original Call to Action Button with about 41% higher percentage of downloads. However, the combination of the New Call to Action Button and New web design results in more than twice as high a percentage of downloads than the combination of the Old Call to Action Button and Old web design.