Business Statistics Communicating with Numbers 2nd edition Jaggia Solutions Manual

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Chapter 2. Tabular and Graphical Methods
Solutions

1.

a.

Rating	Frequency	Relative Frequency
5	12	12/36 = 0.333
4	9	9/36 = 0.250
3	7	7/36 = 0.194
2	5	5/36 = 0.139
1	3	3/36 = 0.083
Total	36	≈1.000

b. More than a third of the patrons are very satisfied with the entrees. Overall more than half of the customers gave a top rating of either 4 or 5. Only 8.3% gave the lowest rating.

2.

a.

Rating	Frequency	Relative Frequency
Excellent	5	5/24 = 0.208
Good	12	12/24 = 0.500
Fair	4	4/24 = 0.167
Poor	3	3/24 = 0.125
Total	24	1.000

b. The most common response is Good which comprises 50% of total responses. More than 70% of the patients reveal that they are in good or excellent health conditions.

3.

a.

Expectation	Frequency	Relative Frequency
Better	5	5/25 = 0.20
Same	16	16/25 = 0.64
Worse	4	4/25 = 0.16

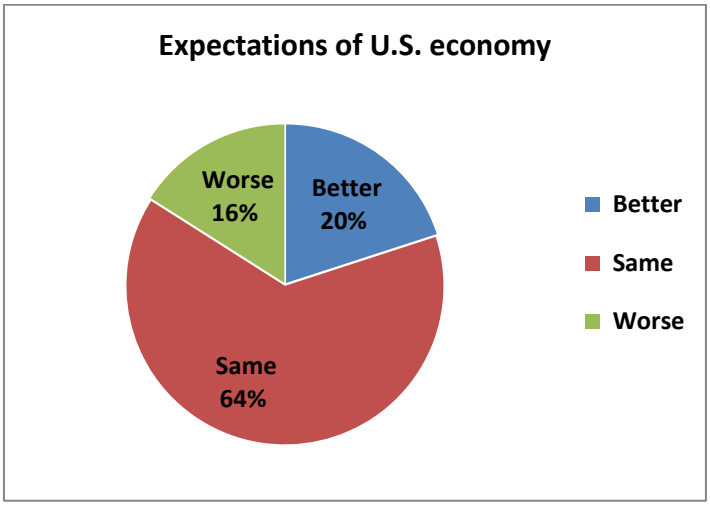
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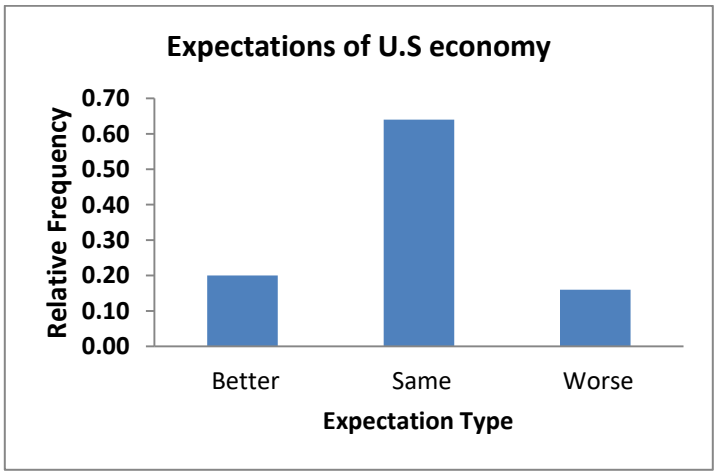
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Total	25	1.00

Most of the chief executives (64%) believed that the economy would be the same in the next 12 months.

b.





4.

a.

Delays	Frequency	Relative Frequency
PM Delays	1	1/18 = 0.056
All Day Delays	6	6/18 = 0.333
AM Delays	4	4/18 = 0.222
None	7	7/18 = 0.389

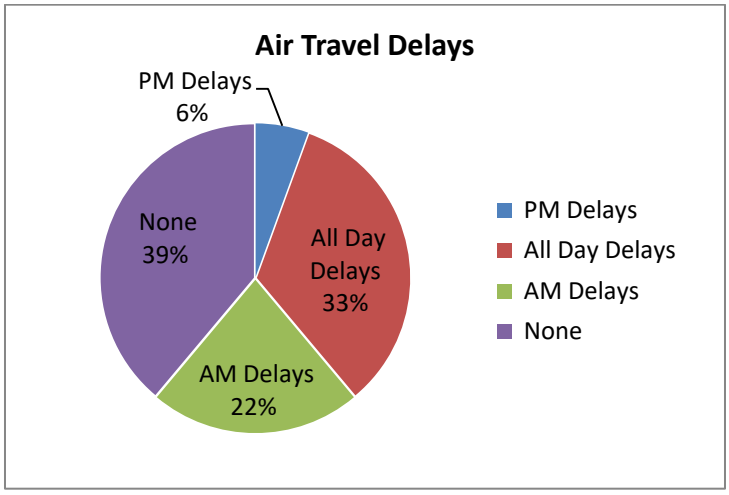
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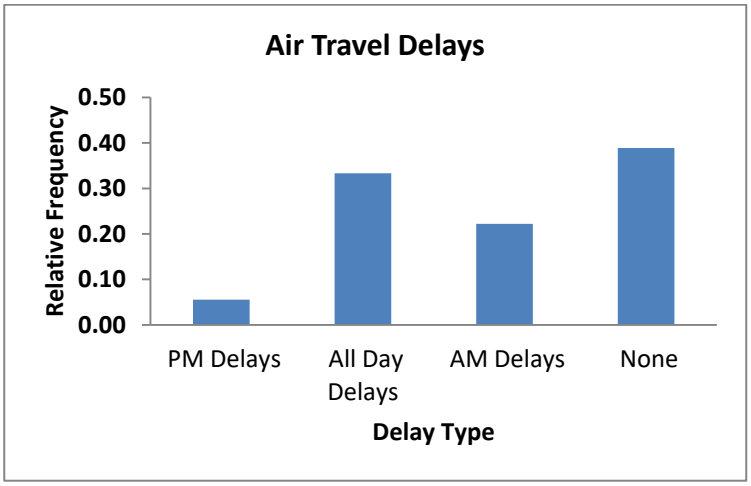
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Total	18	1.000

The most common type of delays was 'None', comprising 38.9% of all types. The second most common type was 'All Day Delays', comprising 33.3%.

b.





5.

a. 22 (18 + 4) out of 50 rookies received a rating of 4 or better; 14 (10 + 4) out of 50 rookies received a rating of 2 or worse.

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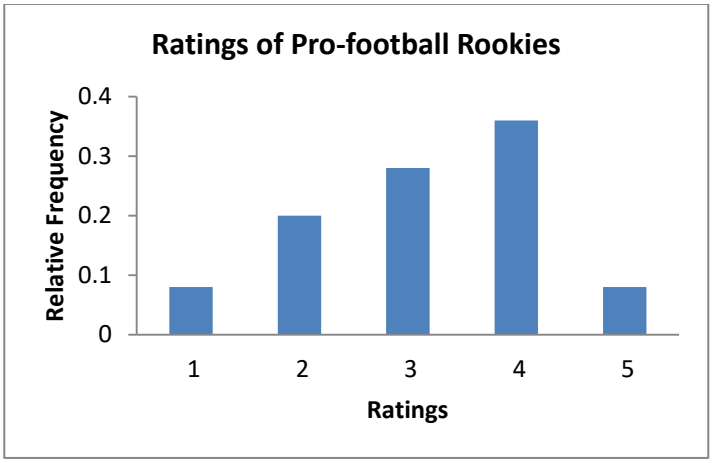
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b.

Rating	Relative Frequency
1	4/50 = 0.08
2	10/50 = 0.20
3	14/50 = 0.28
4	18/50 = 0.36
5	4/50 = 0.08
Total	1.00

8% of the rookies received a rating of 5.

c.



6.

a.

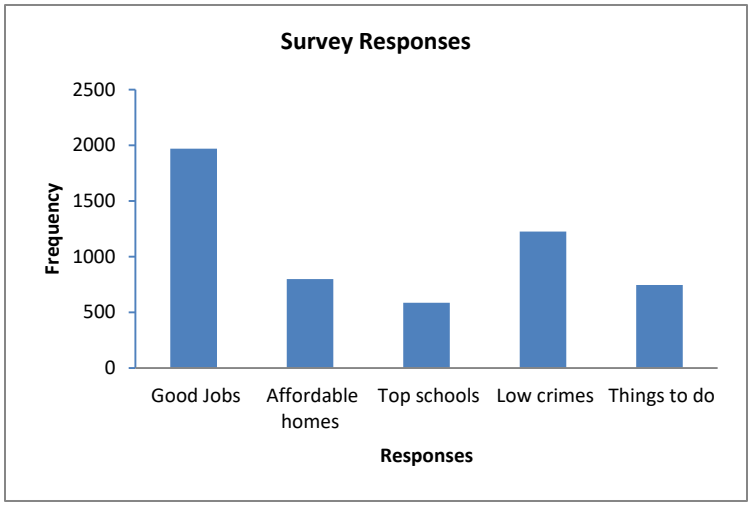
Response	Frequency
Good Jobs	0.37×5,324 = 1,970
Affordable homes	0.15×5,324 = 799
Top schools	0.11×5,324 = 586
Low crimes	0.23×5,324 = 1225
Things to do	0.14×5,324 = 745
Total	5,324

1225 respondents considered 'Low crimes' as the most important criterion.

b.

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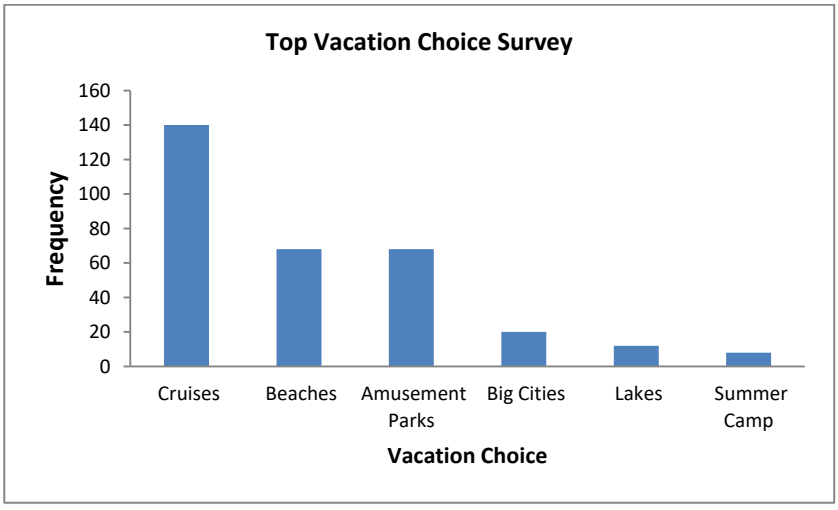
7.

a.

Top Vacation Choice	Relative Frequency
Cruises	140/316 = 0.443
Beaches	68/316 = 0.215
Amusement Parks	68/316 = 0.215
Big Cities	20/316 = 0.063
Lakes	12/316 = 0.038
Summer Camp	8/316 = 0.025
Total	≈ 1.000

44.3% of the children cited 'Cruises' as the perfect summer trip.

b.



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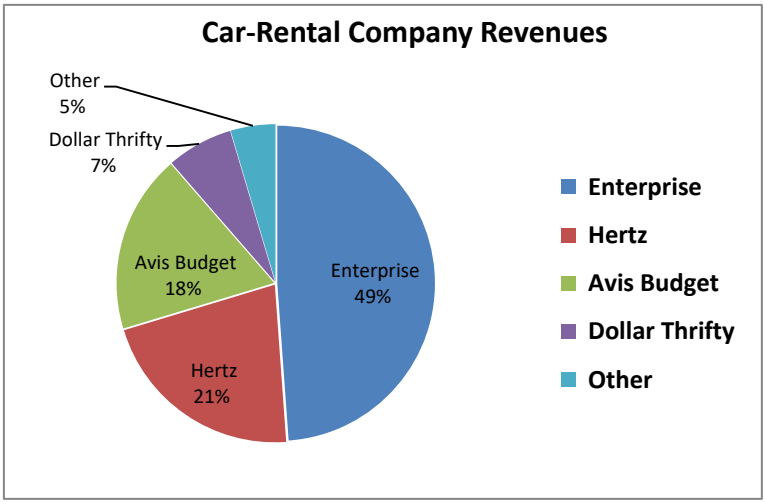
8.

a.

Car-Rental Company	Relative Frequency (Market Share)
Enterprise	10.7/21.9 = 0.489
Hertz	4.7/21.9 = 0.215
Avis Budget	4/21.9 = 0.183
Dollar Thrifty	1.5/21.9 = 0.068
Other	1/21.9 = 0.046
Total	1.000

b. Hertz accounted for 21.5% of sales.

c.

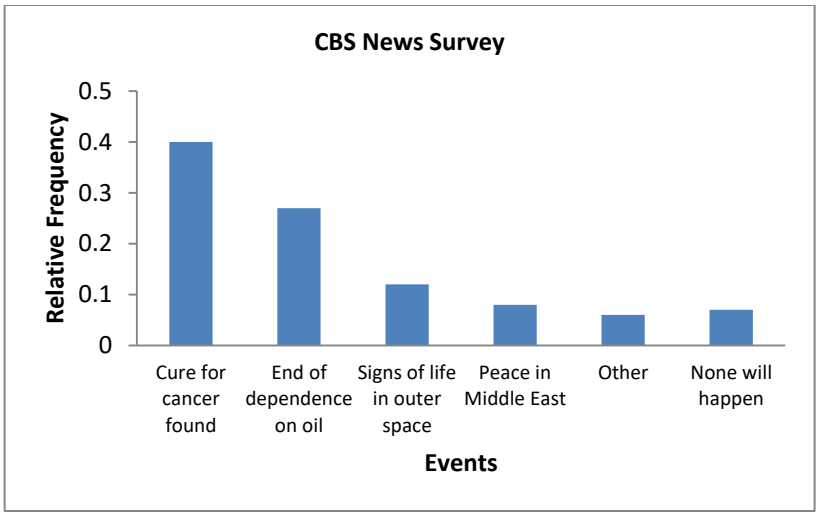


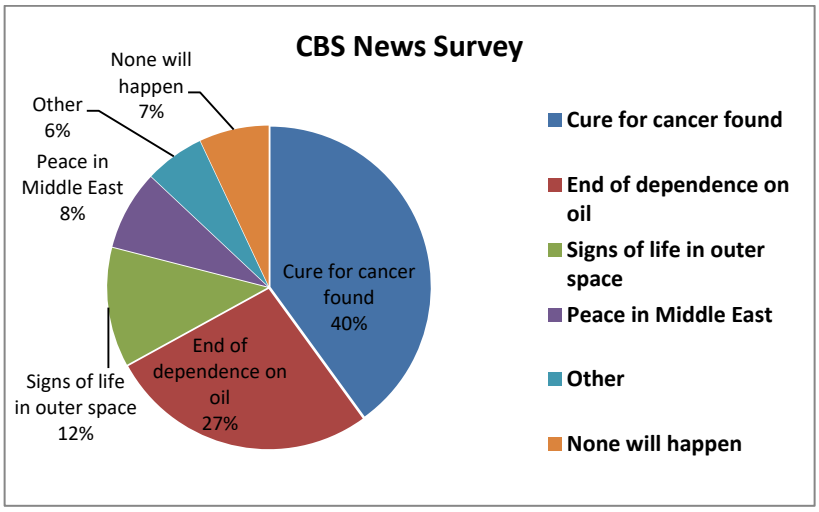
9.

a.

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b. $(0.4 * 829) = 332$ respondents believe that a cure for cancer will be found.

10.

a. The number of responses for "Others" is the difference between the total number of responses and the sum of responses in the table. That is, $20{,}825 - 15{,}241 = 5{,}584$.

b. The proportion of respondents that felt that the Green Bay Packers would win Super Bowl XLV is $1{,}076/20{,}825 = 0.052$.

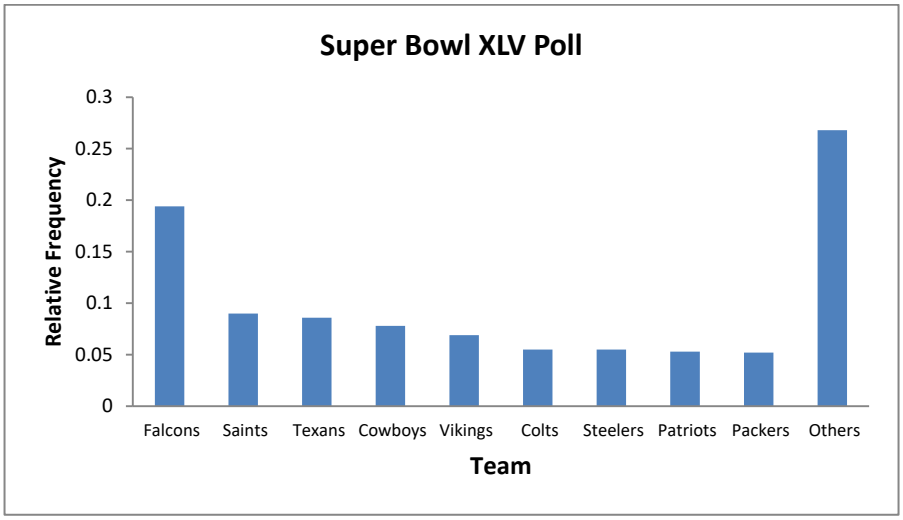
c.

Team	Relative Frequency
Falcons	4,040/20,825 = 0.194
Saints	1,880/20,825 = 0.090
Texans	1,791/20,825 = 0.086

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Cowboys	1,631/20,825 = 0.078
Vikings	1,438/20,825 = 0.069
Colts	1,149/20,825 = 0.055
Steelers	1,141/20,825 = 0.055
Patriots	1,095/20,825 = 0.053
Packers	1,076/20,825 = 0.052
Others	5,584/20,825 = 0.268
Total	1.000



11.

a. Since 60% favored Obama and 30% favored Romney in terms of likeability, then 10% favored neither Obama nor Romney.

b. Of the 500 respondents, 300 (=500×0.60) favored Obama and 150 (=500×0.30) favored Romney. So Obama was favored by 150 more respondents.

12.

a. According to this survey, an athlete in football was most likely to sustain an injury
with lifelong consequences. An athlete in martial arts was least likely to sustain an injury with lifelong
consequences.

b. Approximately 79 respondents (=992×0.08) believed that professional hockey players were most likely to sustain an injury with lifelong consequences.

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13. This graph does not correctly depict what has happened to Caterpillar's stock price over this period. The graph has been given a relatively high value of $500 on the vertical axis. This compresses the data so that the increase of the stock price is not as apparent as it should be.

14. This graph does not correctly depict what has happened to sales over the most recent five-year period. The vertical axis has been stretched so that the increase in sales appears more pronounced than warranted.

15.

a.

Class	Frequency
3 up to 5	5
5 up to 7	5
7 up to 9	8
9 up to 11	4
11 up to 13	5
13 up to 15	3
	Total = 30

b.

Classes	Relative Frequency	Cumulative Frequency	Cumulative Relative Frequency
3 up to 5	5/30 = 0.17	5	0.17
5 up to 7	5/30 = 0.17	5 + 5 = 10	0.17 + 0.17 = 0.34
7 up to 9	8/30 = 0.27	5 + 5 + 8 = 18	0.34 + 0.27 = 0.61
9 up to 11	4/30 = 0.13	5 + 5 + 8 + 4 = 22	0.61 + 0.13 = 0.74
11 up to 13	5/30 = 0.17	5 + 5 + 8 + 4 + 5 = 27	0.74 + 0.17 = 0.91
13 up to 15	3/30 = 0.10	5 + 5 + 8 + 4 + 5 + 3 = 30	0.91 + 0.10 ≈ 1.00
	Total = 1.00		

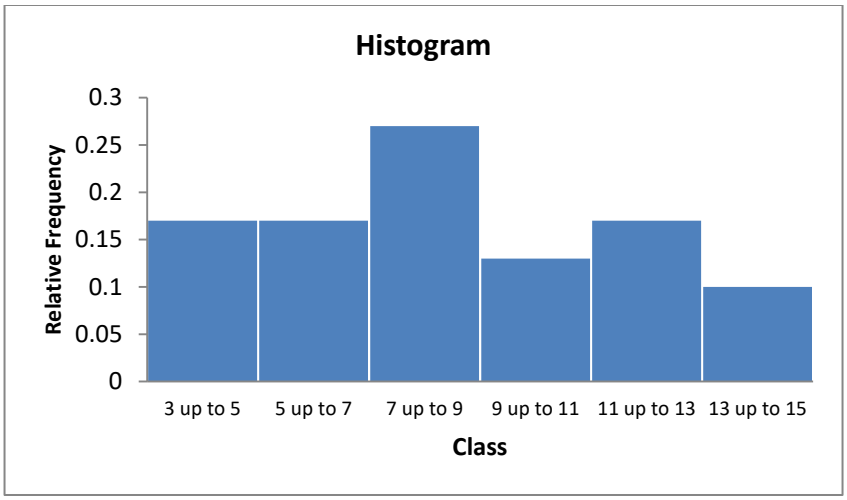
c. 8 observations are at least 7 but less than 9; 18 observations are less than 9.

d. 27% of the observations are at least 7 but less than 9; 61% are less than 9.

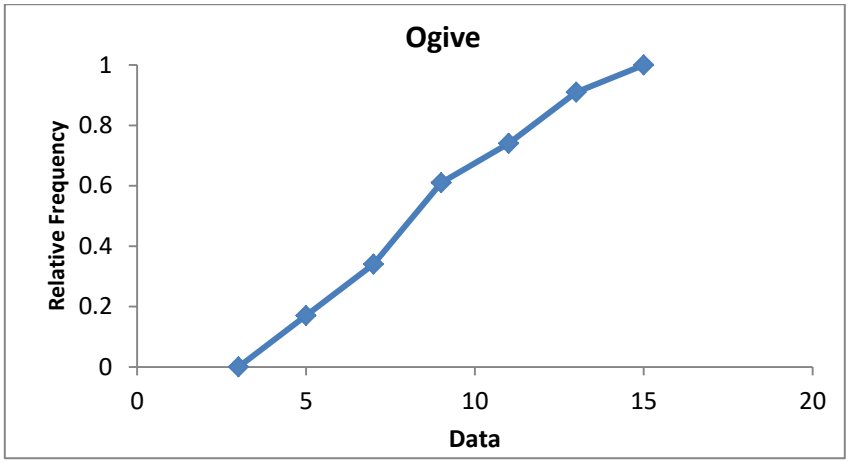
e.

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f.



16.

a.

Classes	Frequency
-10 up to 0	9
0 up to 10	31
10 up to 20	19
20 up to 30	8
30 up to 40	3
	Total = 70

19 observations are at least 10 but less than 20.

b.

Classes	Relative Frequency	Cumulative Relative Frequency
-10 up to 0	9/70 = 0.129	0.129

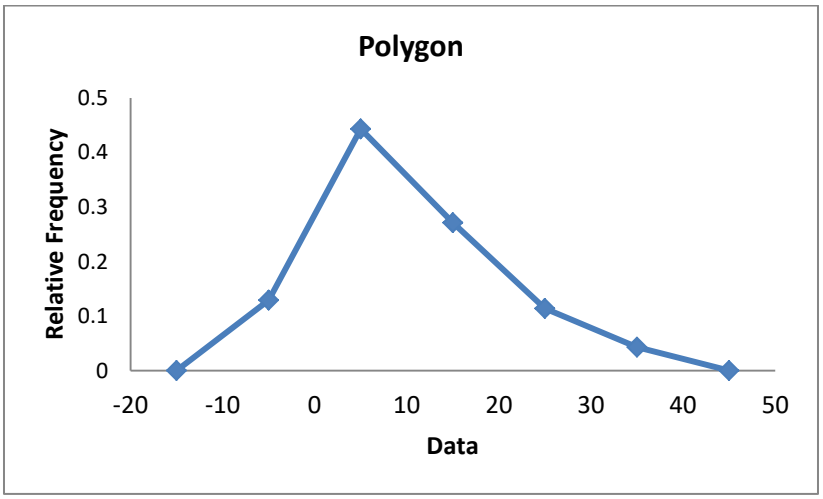
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0 up to 10	31/70 = 0.443	0.129 + 0.443 = 0.572
10 up to 20	19/70 = 0.271	0.129 + 0.443 + 0.271 = 0.843
20 up to 30	8/70 = 0.114	0.129 + 0.443 + 0.271 + 0.114 = 0.957
30 up to 40	3/70 = 0.043	0.129 + 0.443 + 0.271 + 0.114 + 0.043 = 1.000
	Total ≈ 1.000	

27.1% of the observations are at least 10 but less than 20; 84.3% are less than 20.

c.



The distribution is not symmetric. It is positively skewed.

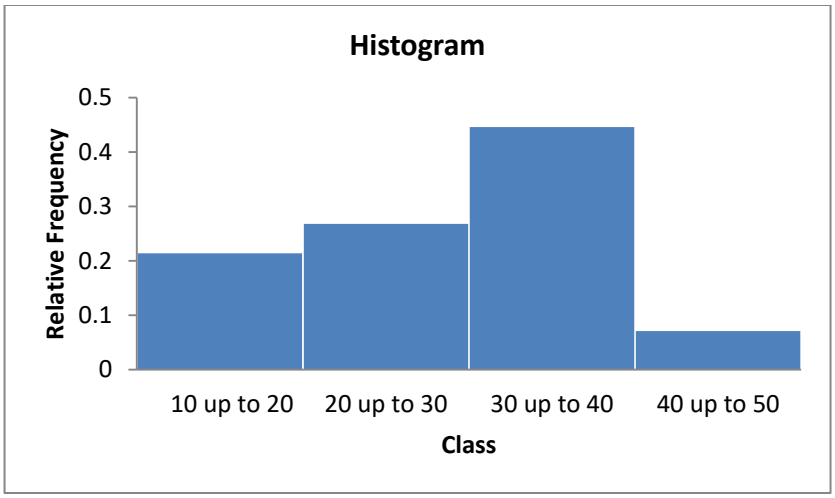
17.

a.

Class	Relative Frequency
10 up to 20	12/56 = 0.214
20 up to 30	15/56 = 0.268
30 up to 40	25/56 = 0.446
40 up to 50	4/56 = 0.071
	Total ≈ 1.000

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b.

Class	Cumulative Frequency	Cumulative Relative Frequency
10 up to 20	12	12/56 = 0.214
20 up to 30	12 + 15 = 27	27/56 = 0.482
30 up to 40	12 + 15 + 25 = 52	52/56 = 0.928
40 up to 50	12 + 15 + 25 + 4 = 56	56/56 = 1.000

c. 44.6% of the observations are at least 30 but less than 40; 92.8% are less than 40.

18.

a.

Class	Relative Frequency
1,000 up to 1,100	2/16 = 0.1250
1,100 up to 1,200	7/16 = 0.4375
1,200 up to 1,300	3/16 = 0.1875
1,300 up to 1,400	4/16 = 0.2500
	Total = 1.0000

43.75% of the observations are at least 1,100 but less than 1,200.

b.

Class	Cumulative Frequency	Cumulative Relative Frequency
1000 up to 1100	2	2/16 = 0.125
1100 up to 1200	2 + 7 = 9	9/16 = 0.562

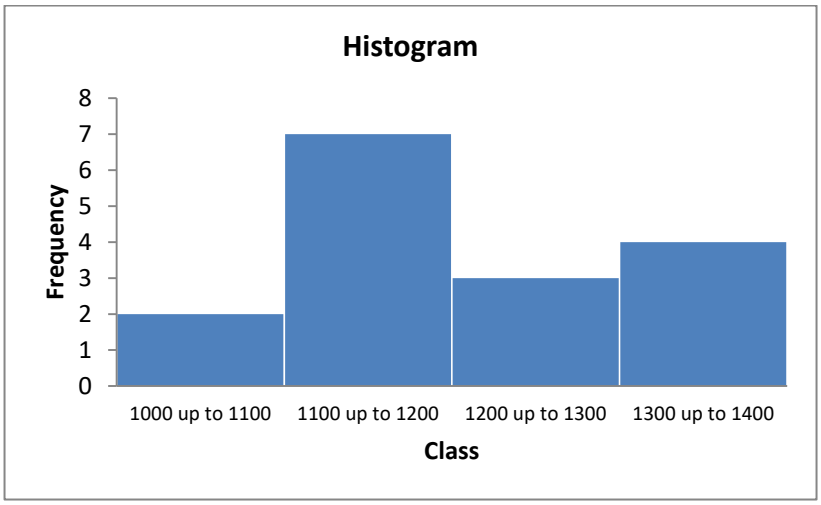
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1200 up to 1300	2 + 7 + 3 = 12	12/16 = 0.750
1300 up to 1400	2 + 7 + 3 + 4 = 16	16/16 = 1.000

12 of the observations are less than 1300.

c.



19.

a.

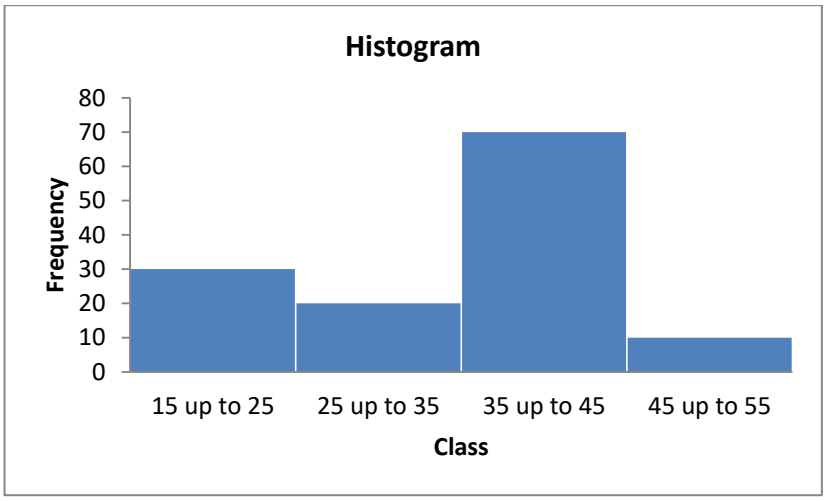
Class	Frequency
15 up to 25	30
25 up to 35	50 - 30 = 20
35 up to 45	120 - 50 = 70
45 up to 55	130 - 120 = 10

70 observations are at least 35 but less than 45.

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b.



c. $120/130 = 0.923$, so 92.3% of the observations are less than 45.

20.

a.

Class	Frequency
-20 up to -10	0.04×50 = 2
-10 up to 0	0.28×50 = 14
0 up to 10	0.26×50 = 13
10 up to 20	0.22×50 = 11
20 up to 30	0.20×50 = 10
	Total = 50

14 observations are at least -10 but less than 0.

b.

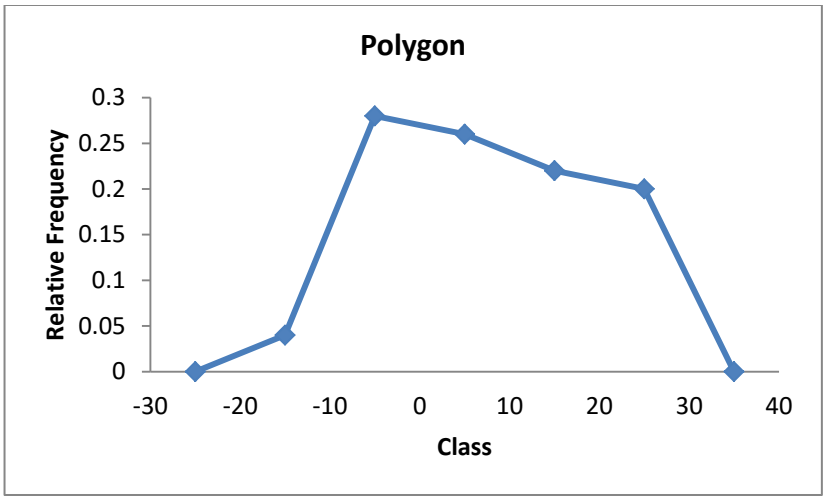
Class	Cumulative Frequency
-20 up to -10	2
-10 up to 0	2 + 14 = 16
0 up to 10	16 + 13 = 29
10 up to 20	29 + 11 = 40
20 up to 30	40 + 10 = 50

40 observations are less than 20.

c.

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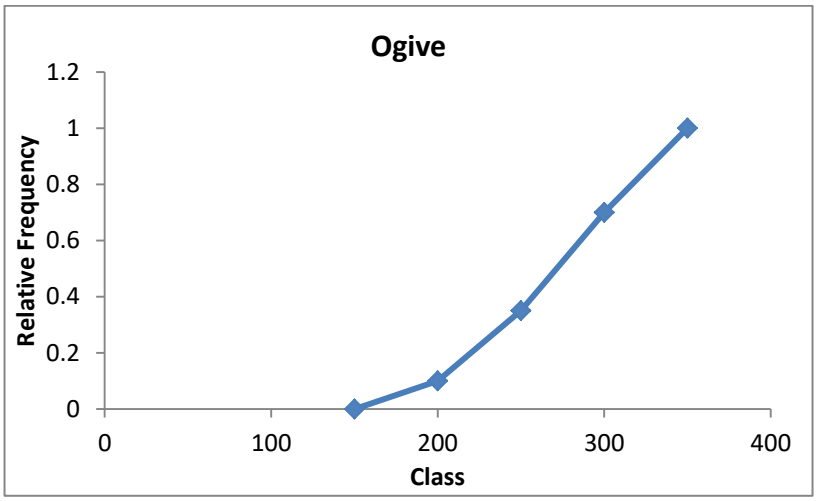
21.

a.

Class	Relative Frequency
150 up to 200	0.10
200 up to 250	0.35 – 0.10 = 0.25
250 up to 300	0.70 – 0.35 = 0.35
300 up to 350	1 – 0.70 = 0.30
	Total = 1.00

35% of the observations are at least 250 but less than 300.

b.



22.

a.

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Assets (in billions)	Frequency
40 up to 70	9
70 up to 100	8
100 up to 130	2
130 up to 160	0
160 up to 190	1
	Total = 20

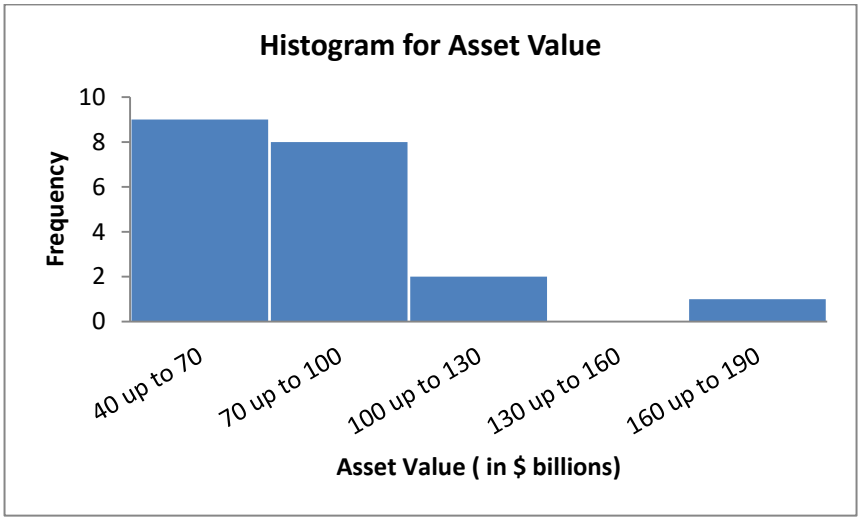
b.

Assets (in billions)	Relative Frequency	Cumulative Frequency	Cumulative Relative Frequency
40 up to 70	9/20 = 0.45	9	9/20 = 0.45
70 up to 100	8/20 = 0.40	9 + 8 = 17	17/20 = 0.85
100 up to 130	2/20 = 0.10	17 + 2 = 19	19/20 = 0.95
130 up to 160	0/20 = 0	19 + 0 = 19	19/20 = 0.95
160 up to 190	1/20 = 0.05	19 + 1 = 20	20/20 = 1

c. Two funds had assets of at least 100 but less than 130 (in $ billions); 19 funds had assets less than $160 billion.

d. 40% of the funds had assets of at least $70 but less than $100 (in billions); 95% of the funds had assets less than $130 billion.

e.



The distribution is positively skewed.
Note: The histogram could have also been made with relative frequencies. It would have had the same positive skewness.

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23.

a.

Texts	Frequency
500 up to 600	4
600 up to 700	7
700 up to 800	5
800 up to 900	4
900 up to 1000	5
	Total = 25

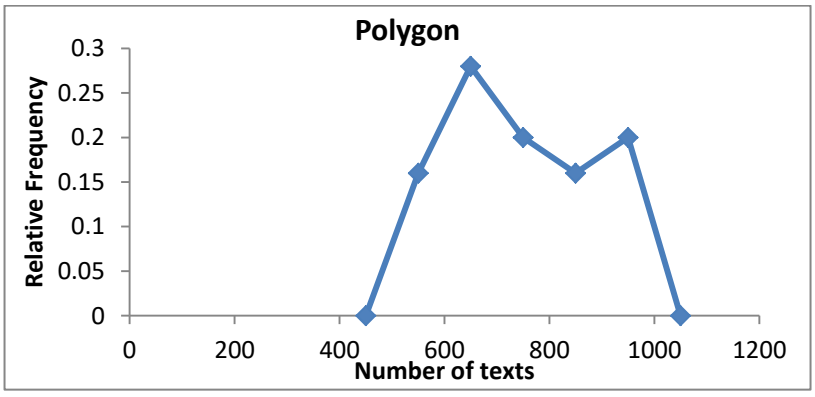
b.

Texts	Relative Frequency	Cumulative Frequency	Cumulative Relative Frequency
500 up to 600	4/25 = 0.16	4	4/25 = 0.16
600 up to 700	7/25 = 0.28	4 + 7 = 11	11/25 = 0.44
700 up to 800	5/25 = 0.20	11 + 5 = 16	16/25 = 0.64
800 up to 900	4/25 = 0.16	16 + 4 = 20	20/25 = 0.80
900 up to 1000	5/25 = 0.20	20 + 5 = 25	25/25 = 1.00
Total	1.00		

c. 7 teens sent at least 600 but less than 700 texts; 16 sent less than 800 texts.

d. 16% of the teens sent at least 500 but less than 600 texts; 44% of them sent less than 700 texts.

e.



The distribution is not symmetric; it is slightly positively skewed.

24.

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a.

Temperature	Frequency
60 up to 70	2
70 up to 80	7
80 up to 90	14
90 up to 100	10
	Total = 33

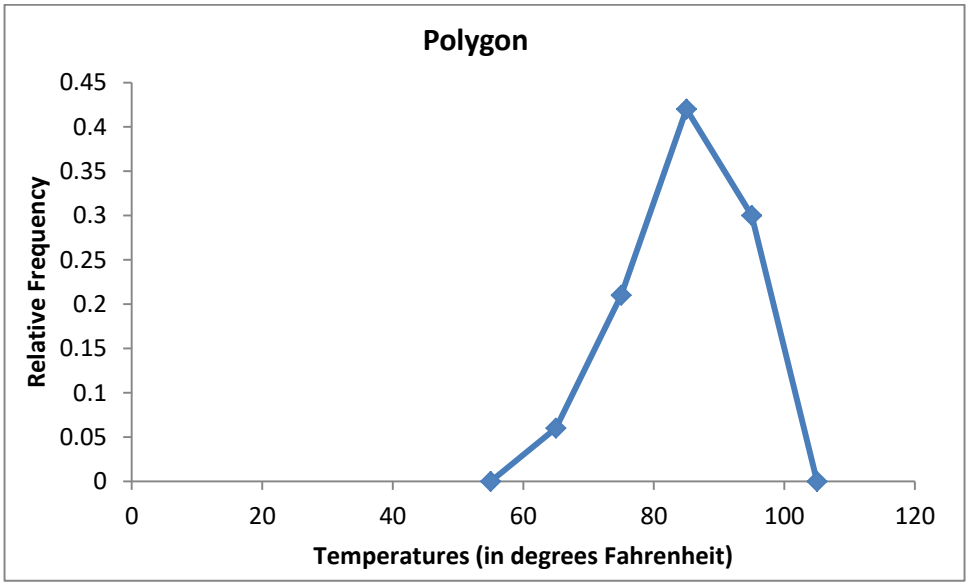
b.

Temperature	Relative Frequency	Cumulative Frequency	Cumulative Relative Frequency
60 up to 70	2/33 = 0.061	2	2/33 = 0.061
70 up to 80	7/33 = 0.212	2 + 7 = 9	9/33 = 0.273
80 up to 90	14/33 = 0.424	9 + 14 = 23	23/33 = 0.697
90 up to 100	10/33 = 0.303	23 + 10 = 33	33/33 = 1.000
	Total = 1.000		

c. 9 cities had temperatures less than 80°.

d. 42.4% of the cities recorded temperatures of at least 80° but less than 90°; 69.7% of the cities had temperatures less than 90°.

e.



The distribution is slightly negatively skewed.

25.

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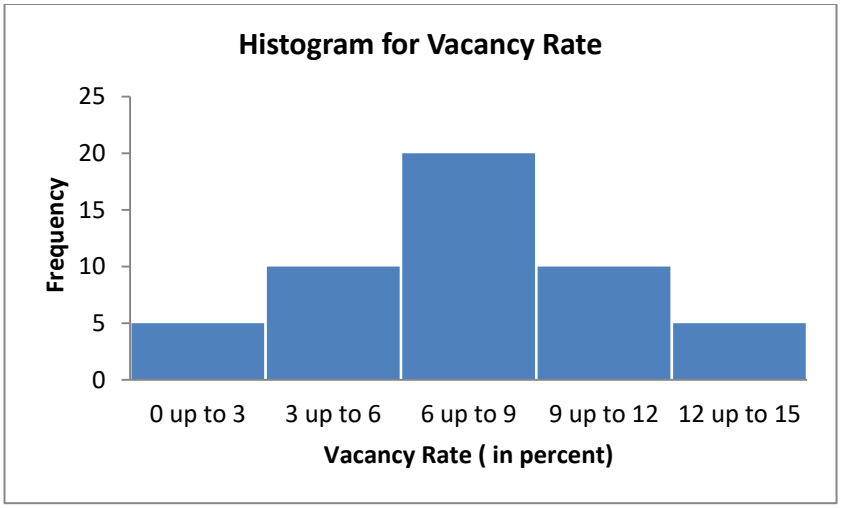
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a.

Vacancy Rate (%)	Relative Frequency	Cumulative Frequency	Cumulative Relative Frequency
0 up to 3	5/5 = 0.10	5	0.10
3 up to 6	10/50 = 0.20	5 + 10 = 15	0.10 + 0.20 = 0.30
6 up to 9	20/50 = 0.40	15 + 20 = 35	0.30 + 0.40 = 0.70
9 up to 12	10/50 = 0.20	35 + 10 = 45	0.70 + 0.20 = 0.90
12 up to 15	5/50 = 0.10	45 + 5 = 50	0.90 + 0.10 = 1.00
	Total = 1.00		

b. 45 cities had a vacancy rate of less than 12%; 40% of the cities had a vacancy rate of at least 6% but less than 9%; 70% of the cities had a vacancy rate of less than 9%.

c.



The distribution is symmetric.

26.

a.

Age	Frequency	Cumulative Frequency	Cumulative Relative Frequency
15 up to 20	0.10(2000) = 200	200	0.1
20 up to 25	0.25(2000) = 500	200 + 500 = 700	0.10 + 0.25 = 0.35
25 up to 30	0.28(2000) = 560	700 + 560 = 1,260	0.35 + 0.28 = 0.63
30 up to 35	0.24(2000) = 480	1,260 + 480 = 1,740	0.63 + 0.24 = 0.87
35 up to 40	0.11(2000) = 220	1,740 + 220 = 1,960	0.87 + 0.11 = 0.98

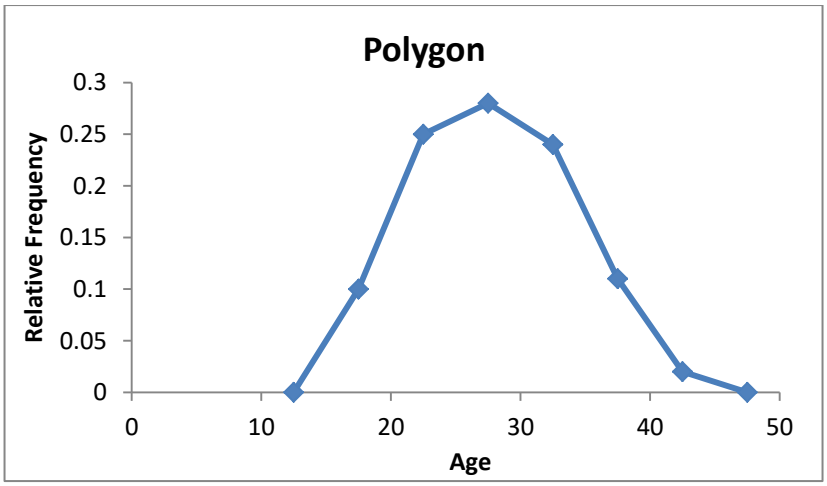
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40 up to 45	0.02(2000) = 40	1,960 + 40 = 2,000	0.98 + 0.02 = 1.00
	Total = 2000		

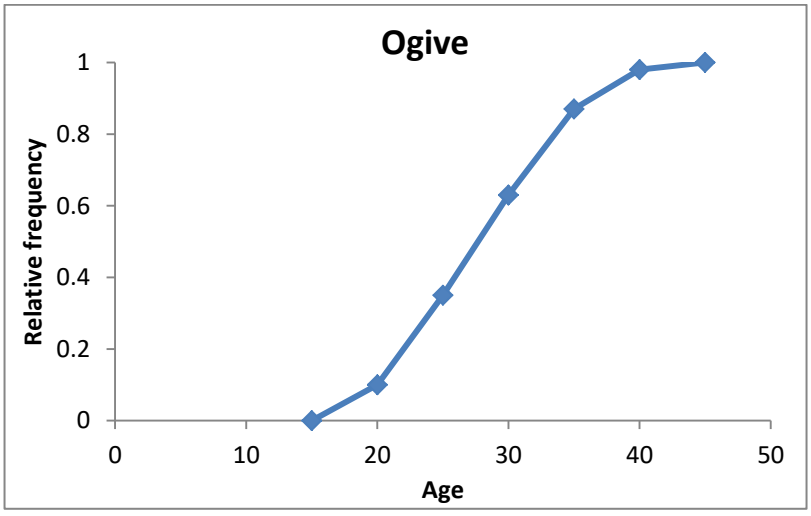
b. 28% of the women were at least 25 but less than 30 years old; 87% were less than 35 years old.

c.



The distribution appears to be relatively symmetric with possibly a slight positive skew.

d.



If we draw a horizontal line that corresponds to the 0.5 value on the vertical axis, it will intersect
the ogive at the age of approximately 28 years old.

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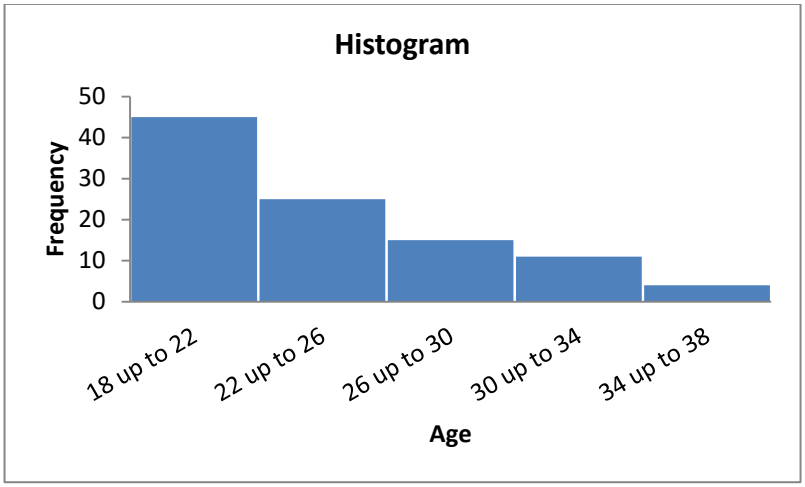
27.

a.

Age	Frequency	Relative Frequency	Cumulative Relative Frequency
18 up to 22	45	45/100 = 0.45	0.45
22 up to 26	70 – 45 = 25	25/100 = 0.25	0.45 + 0.25 = 0.70
26 up to 30	85 – 70 = 15	15/100 = 0.15	0.70 + 0.15 = 0.85
30 up to 34	96 – 85 = 11	11/100 = 0.11	0.85 + 0.11 = 0.96
34 up to 38	100 – 96 = 4	4/100 = 0.04	0.96 + 0.04 = 1.00
	Total = 100	Total = 1.00	

b. Fifteen guests were at least 26 but less than 30 years old; 25% of the guests were at least 22 but less than 26 years old; 96% of the guests were younger than 34 years old; 4% were 34 years or older.

c.



The histogram shows a positively skewed data set reflecting the relatively young age of the nightclub's guests.

28.

a. No. The distribution is not symmetric. It is positively skewed.

b. Forty-four percent of the states had median household income between $45,000 and $55,000.

c. Sixty-six percent of the states had median household income between $35,000 and $55,000.

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29.

a. Draw a vertical line through Income of 50. It intercepts with the ogive at the point of about 0.4. Thus, about 40% of the states had median household income less than $50,000.

b. Draw a vertical line through Income of 60. It intercepts with the ogive at the point of about 0.80. Thus, about 80% of the states had median household income less than $60,000. It is equivalent that about 20% of the states had median household of more than $60,000.

30.

a. No. The distribution is not symmetric. It is positively skewed.

b. The minimum monthly stock price is approximately $50 and the maximum stock price is approximately $450.

c. The $50 - $150 class has the highest relative frequency, which is about 0.35.

31.

a. No. The distribution is not symmetric. It is positively skewed.

b. Three (0.10×30) NBA players earned between $20,000,000 and $24,000,000.

c. About 26 (0.43×30+0.43×30=25.8) NBA players earned between $12,000,000 and $20,000,000.

32.

a. Draw a vertical line through Salary of 18. It intercepts with the ogive at the point of about 0.70. Thus, about 70% of the salaries were less than $18,000,000.

b. Draw a vertical line through Salary of 14. It intercepts the ogive at the point of about 0.15. Thus, about 15% of the salaries were less than $14,000,000. It is equivalent that about 85% of the salaries were more than $14,000,000.

33.

a.

SAT Scores	Frequency
450 - 500	6
501 - 550	24
551 - 600	15
601 - 650	5

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	Total = 50

The distribution is positively skewed. Fifteen states had scores between 551 and 600.

b.

SAT Scores	Relative Frequency	Cumulative Frequency	Cumulative Relative Frequency
450 - 500	6/50 = 0.12	6	6/50 = 0.12
501 - 550	24/50 = 0.48	6 + 24 = 30	30/50 = 0.60
551 - 600	15/50 = 0.30	30 + 15 = 45	45/50 = 0.90
601 - 650	5/50 = 0.10	45 + 5 = 50	50/50 = 1.00
	Total = 1.00		

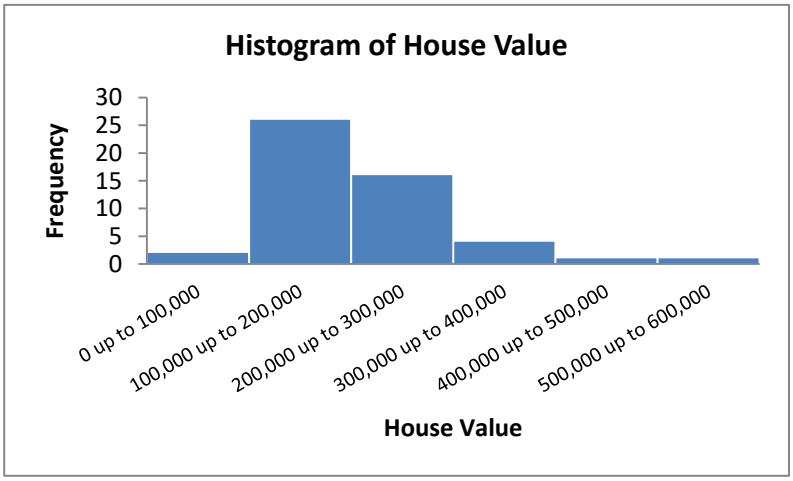
c. 30 states had scores of 550 or less.

d. 30% of the states had scores between 551 and 600; 60% of the states had scores of 550 or less.

34.

a.

House Value	Frequency
0 up to 100,000	2
100,000 up to 200,000	26
200,000 up to 300,000	16
300,000 up to 400,000	4
400,000 up to 500,000	1
500,000 up to 600,000	1
	Total = 50



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b. No. The distribution is not symmetric. It is positively skewed.

c. The class "$100,000 up to $200,000" has the highest frequency.

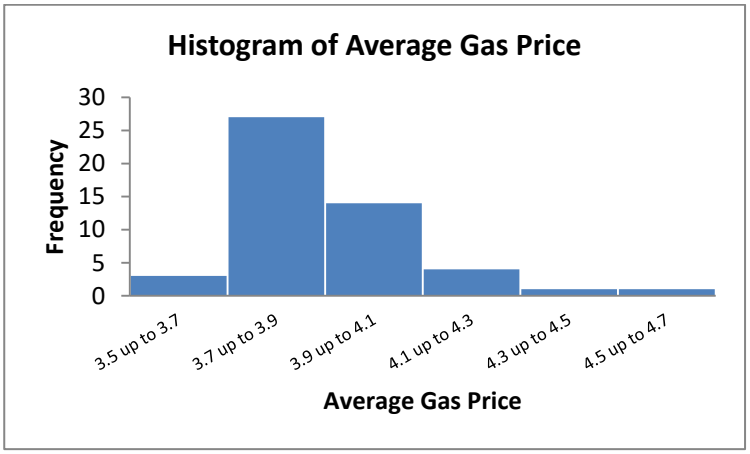
d. Eight percent (4/50 = 0.08) of the states have median house values between $300,000 and $400,000.

e. Forty-four states (2+16+26=44) have median house values less than $300,000.

35.

a.

Price/Gallon	Frequency
3.5 up to 3.7	3
3.7 up to 3.9	27
3.9 up to 4.1	14
4.1 up to 4.3	4
4.3 up to 4.5	1
4.5 up to 4.7	1
	Total = 50



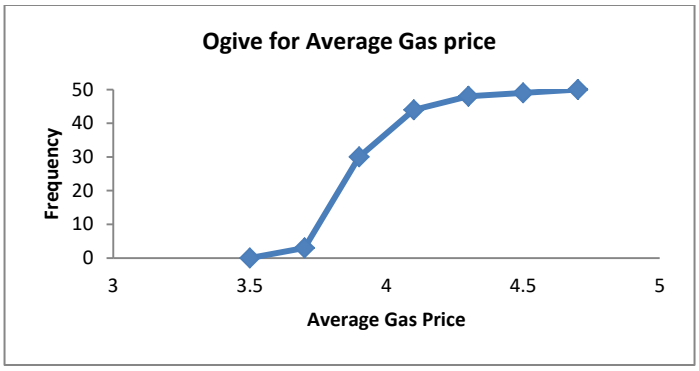
b. No. The distribution is not symmetric. It is positively skewed.

c. The class "$3.7 up to $3.9" has the highest frequency.

d.

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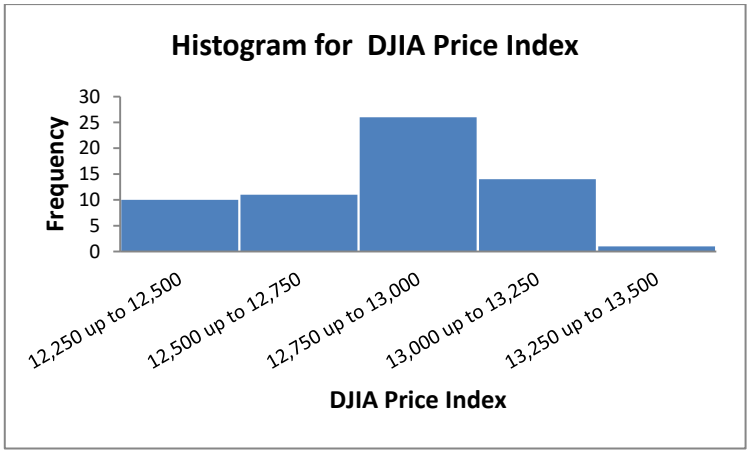


Draw a vertical line through Price of 3.90. It intercepts the ogive at the point of about 30. Thus, about thirty states had average gas prices of $3.90 or less, which is about 60% of the states. Consequently, about 40% of the states had average gas prices greater than $3.90.

36.

a.

DJIA Price Index	Frequency
12,250 up to 12,500	10
12,500 up to 12,750	11
12,750 up to 13,000	26
13,000 up to 13,250	14
13,250 up to 13,500	1
	Total = 62

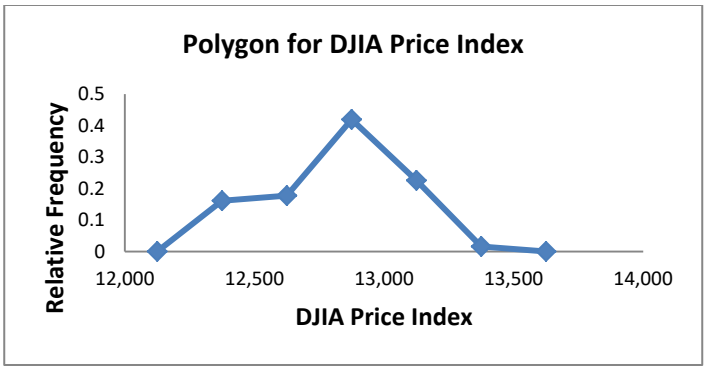


The DJIA was less than 12,500 on 10 days during this quarter.

b.

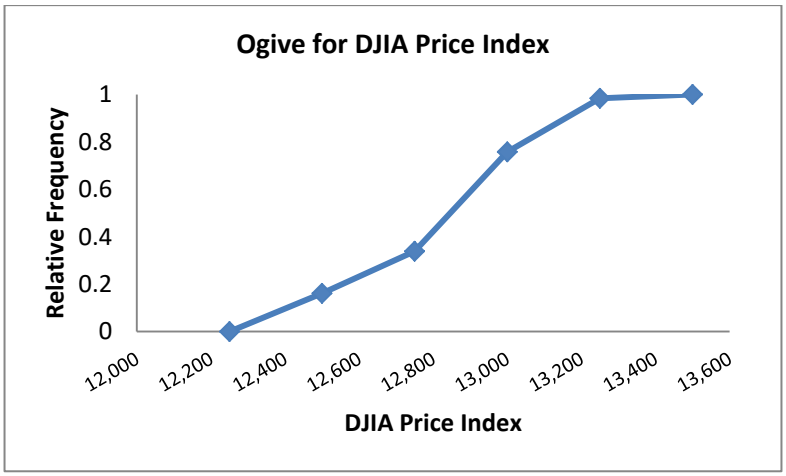
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The distribution is not symmetric. It is positively skewed.

c.



Draw a vertical line through Index of 13,000. It intercepts the ogive at the point of about 0.80. Thus, approximately 80% of the days the DJIA was less than 13,000.

37.

Stem	Leaf
2.	3 6 8
3.	0 2 2 3 4 5 6
4.	0 2 2 2 5 6 7
5.	4 5 5

This distribution is symmetric. There are the same number of observations on each end of the data, and the same number of observations in the middle.

38.

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Stem	Leaf
-8	7 5 5 3 2 0 0 0
-7	9 7 5 3 3 2 1
-6	5 5 4
-5	2 0

(Keep in mind that these values are negative.) The distribution is not symmetric; it is positively skewed. Most of the numbers are in the lower stems of -8 and -7.

39.

Stem	Leaf
99	6 7 8
100	4 5
101	0 2 2 2 3 5 5 6
102	0 1 2 2 3 4 5

The temperatures ranged from a low of 99.6 to a high of 102.5. The distribution is not symmetric; it has negative skew. The majority of patients recorded a temperature higher than 101.

40.

Stem	Leaf
7	3 4 6 7 8 8
8	0 1 2 3 4 4 4 4 7 8
9	0 0 0 1 1 2 2 2 3 3 4 4 4 4 4 5 6 6 6 8 8 9
10	6 7

Temperatures ranged from a low of 73 to a high of 107. The distribution is not symmetric; it has negative skew. Temperatures in 90s were the most frequent.

41.

Stem	Leaf
6	5 5 6 7 7
7	0 0 0 1 1 2 2 3 3 3 5 5 8 9
8	0 0 0 1 1 2

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The officers concerns are warranted. The data shows that the majority of cars exceed the 65 miles-per-hour limit.

42.

Spain

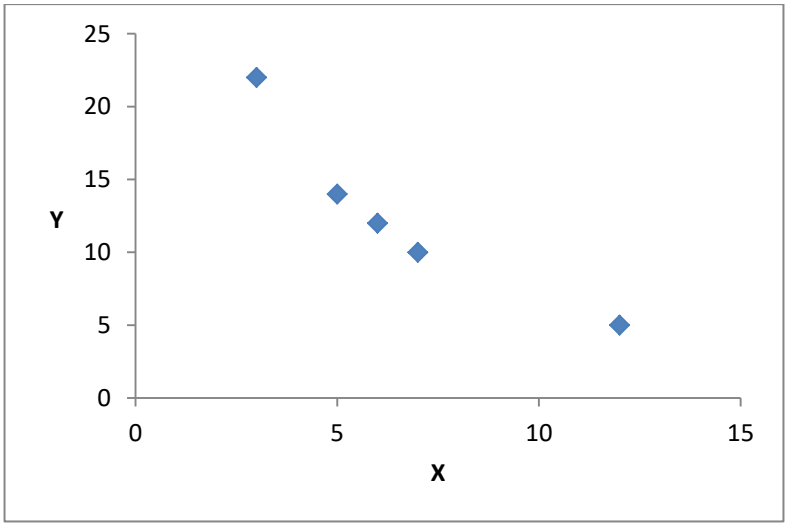
Stem	Leaf
2	1 1 1 2 3 3 4 4 5 5 5 6 7 8 9 9 9
3	0 0 2

Netherlands

Stem	Leaf
2	2 3 3 4 5 5 5 6 6 6 7 7 7 7 9
3	0 3 5 5 9

Spain has a relatively younger team compared to Netherlands. Spain's ages range from 21 to 32, while Netherlands' ages range from 22 to 39. The majority of players in both teams are in their 20s. However, Netherlands has a couple of more players in their 30s than Spain.

43.

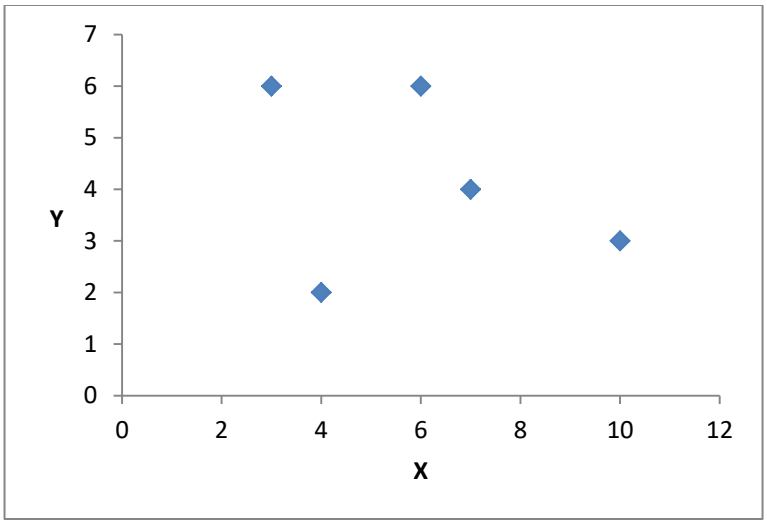


There is a negative linear relationship between x and y. As x increases, y tends to decrease.

44.

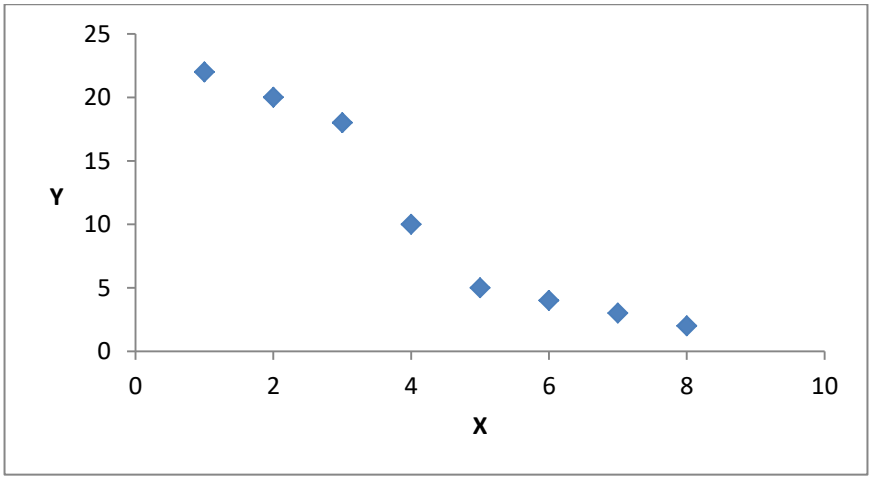
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There is no evident relationship between *x* and *y*.

45.

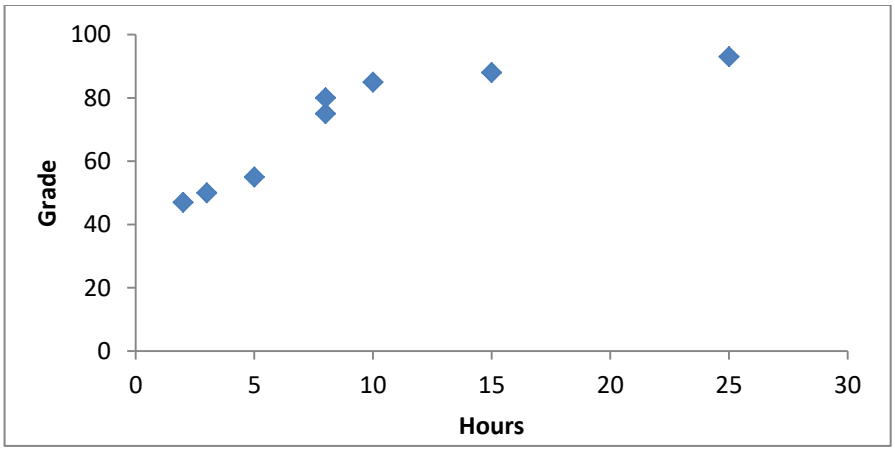


There is a negative relationship between *x* and *y*. As *x* increases, *y* tends to decrease.

46.

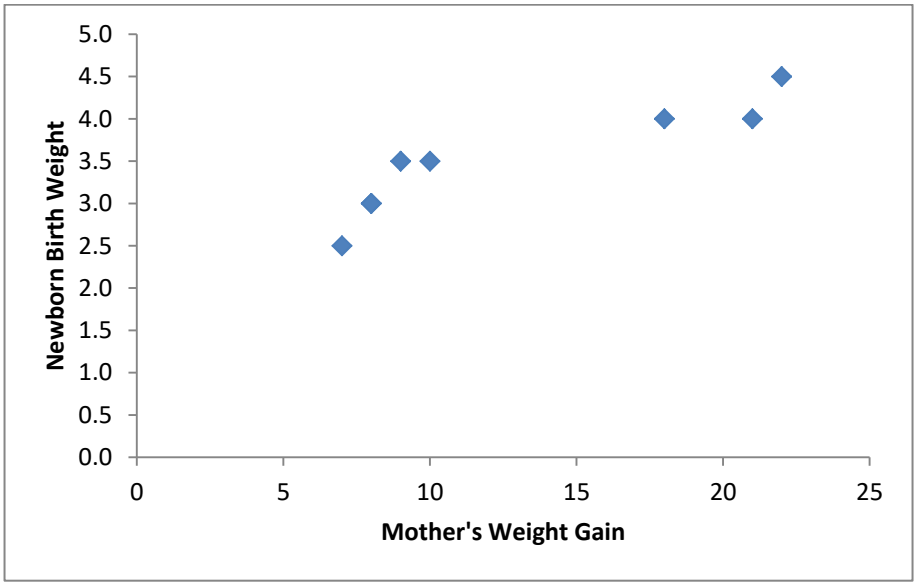
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There is a positive relationship between number of hours spent studying and grades. As the number of hours spent studying increases, grades tend to increase.

47.

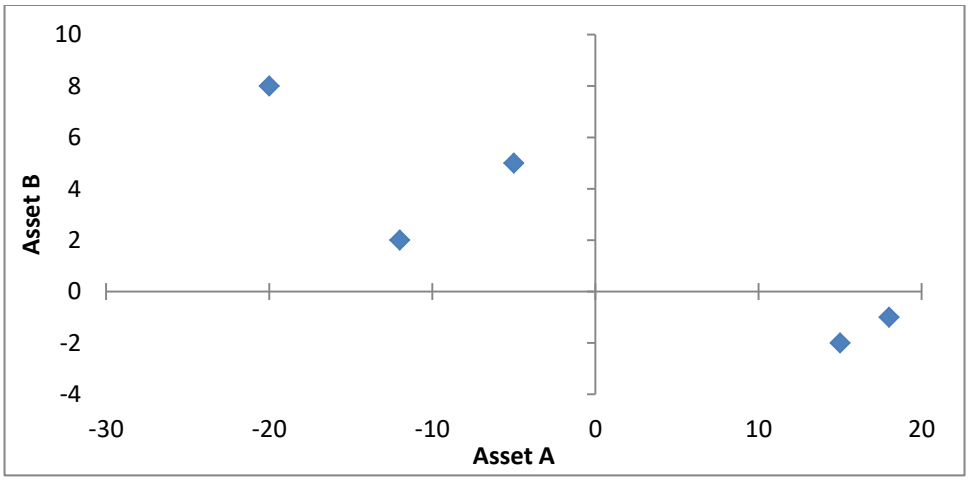


The results support the finding. As a mother's weight gain increases, the newborn's birth weight tends to increase well.

48.

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There is a slightly negative relationship between the two assets. Therefore, it would be wise for the investor to include them in her portfolio.

49.



There is a positive relationship. The realtor can conclude that generally, with higher home prices, the number of days to sell the home will tend to be higher as well.

50.

a.

Responses	Utah	Kentucky
	Relative Frequency	Relative Frequency
Yes	2/20 = 0.10	9/20 = 0.45
No	18/20 = 0.90	11/20 = 0.55

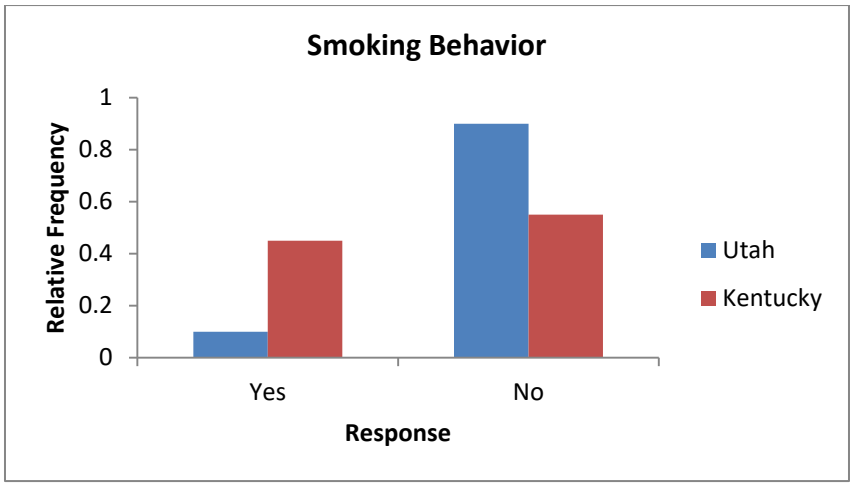
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	Total = 1.00	Total = 1.00

The sample responses show the difference regarding smoking behavior in the two states. Notice that 45% of the households in Kentucky allow smoking at home whereas only 10% do so in Utah.

b.



The bar chart shows that smoking at home is much more common in Kentucky than in Utah.

51.

a.

Rating	Frequency	Relative Frequency
Outstanding	0	0/28 = 0
Good	8	8/28 = 0.286
Ok	7	7/28 = 0.250
Horrible	13	13/28 = 0.464
	Total = 28	Total = 1

From the relative frequency distribution, we can conclude that the majority of the evaluations were either “OK” or “Horrible”. Notice that none of the responses included “Outstanding”. Therefore, it is necessary for the owner of the restaurant to improve the service and/or experience provided.

b.

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The pie chart which depicts categorical data in percentage values demonstrates the poor evaluations received.



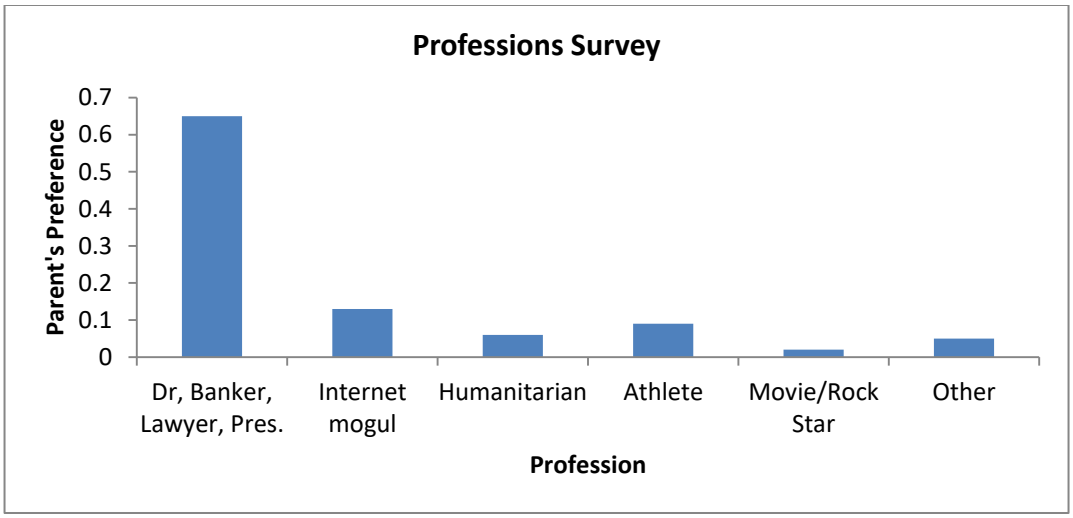
The bar chart is another way to depict categorical data effectively. We notice that the highest bar corresponds to the last category "Horrible", and that there are no responses given for "Outstanding."

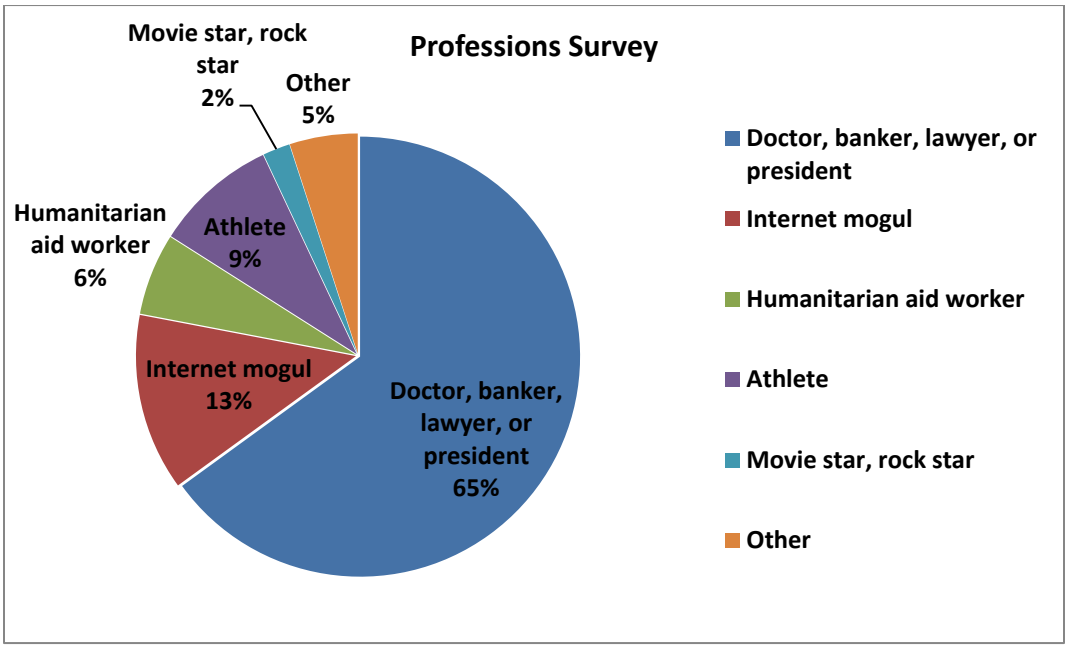
52.

a.

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The charts reveal parent preferences. Sixty-five percent of parents want their children to have a profession such as a doctor, lawyer, banker or president. Less preferable are other professions such humanitarian-aid worker or a movie star.

b. Since 9% of parents want their children to become an athlete, we find $550 \times 0.09 \approx 50$. Therefore, among 550 parents approximately 50 parents want their kids to become an athlete.

53.

a.

Classes	Frequency

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-20 up to -10	4
-10 up to 0	7
0 up 10	9
10 up 20	3
20 up to 30	1
	Total = 24

b.

Classes (in %)	Relative Frequency	Cumulative Frequency	Cumulative Relative Frequency
-20 up to -10	4/24 = 0.167	4	4/24 = 0.167
-10 up to 0	4/24 = 0.292	4 + 7 = 11	11/24 = 0.458
0 up 10	9/24 = 0.375	11 + 9 = 20	20/24 = 0.833
10 up 20	3/24 = 0.125	20 + 3 = 23	23/24 = 0.958
20 up to 30	1/24 = 0.042	23 + 1 = 24	24/24 = 1.000
	Total ≈ 1.000		

c. Nine funds had returns of at least 0% but less than 10%; there were 4 funds with returns of 10% or more.

d. 12.5% of the funds had a return of at least 10% but not greater than 20%; 95.8% of the funds had returns less than 20%.

54.

a.

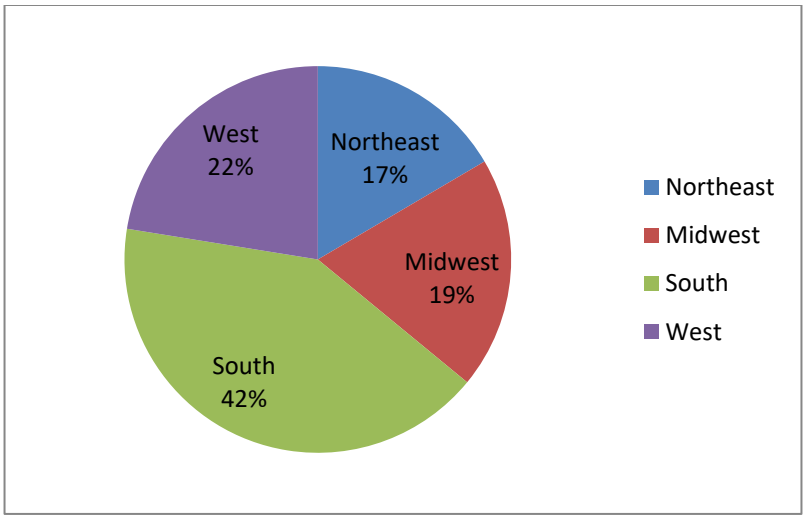
Region	Relative Frequency
Northeast	6,166/37,276 = 0.165
Midwest	7,237/37,276 = 0.194
South	15,501/37,276 = 0.416
West	8,372/37,276 = 0.225
	Total = 1.000

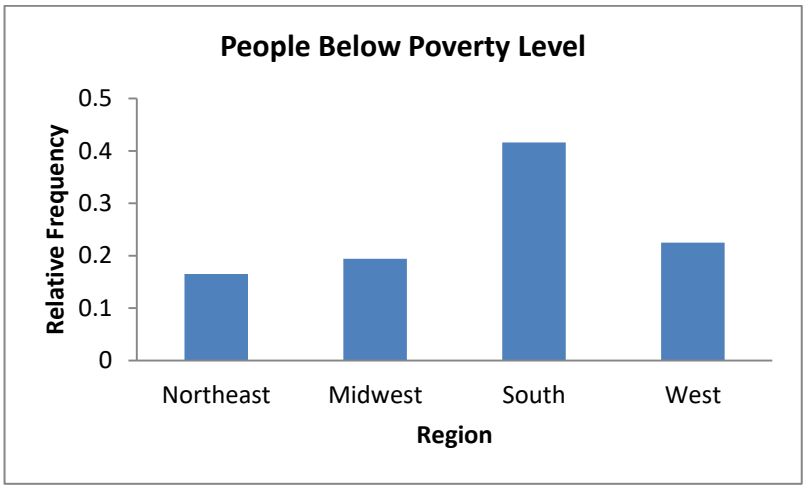
19.4% of people living below the poverty level live in the Midwest region.

b.

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These charts show that the highest percentage of people who live below the poverty level live in the South, and the lowest percentage live in the Northeast.

55.

a.

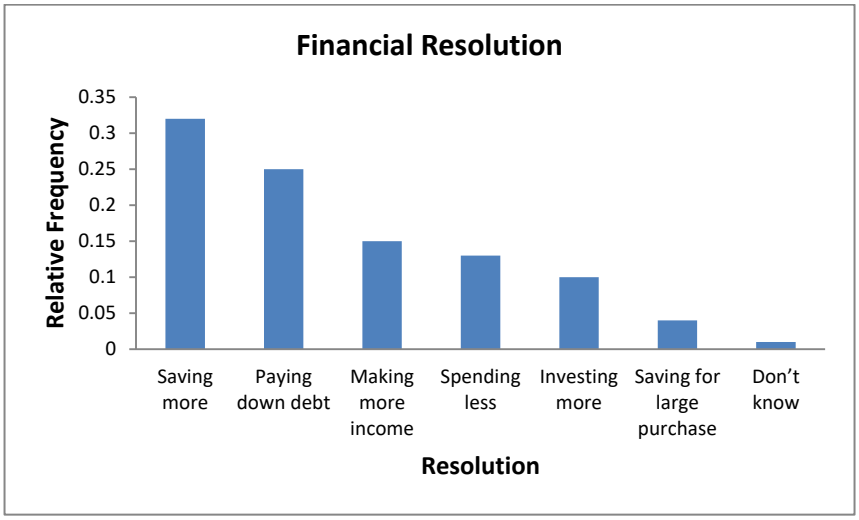
Resolution	Relative Frequency
Saving more	328/1026 = 0.32
Paying down debt	257/1026 = 0.25
Making more income	154/1026 = 0.15
Spending less	133/1026 = 0.13
Investing more	103/1026 = 0.10
Saving for large purchase	41/1026 = 0.04
Don’t know	10/1026 = 0.01
	Total = 1.00

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25% of the respondents said paying down debt was their top financial resolution.

b.



The bar chart shows that "Saving more" is the top financial resolution, followed by "Paying down debt". Only a small portion of the respondents didn't know their financial resolution.

56.

a.

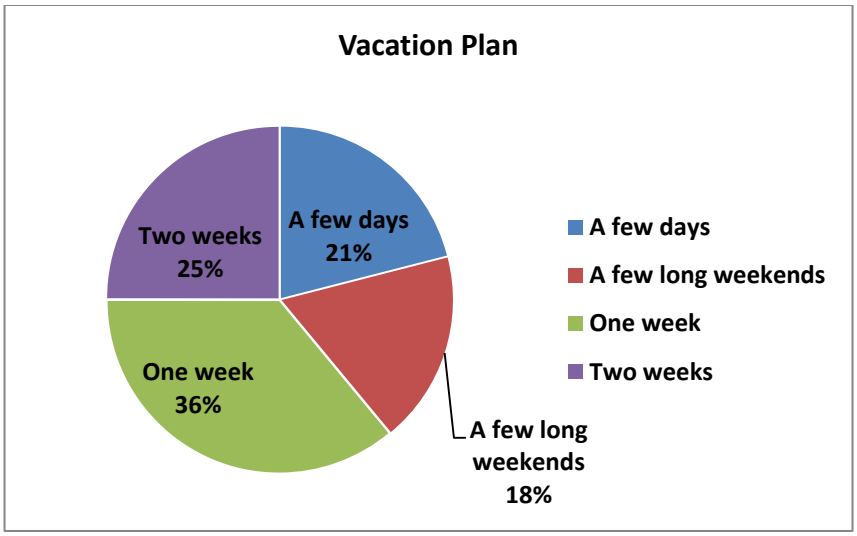
Response	Frequency
A few days	0.21(3057) = 642
A few long weekends	0.18(3057) = 550
One week	0.36(3057) = 1101
Two weeks	0.25(3057) = 764
	Total = 3057

Approximately 1101 people are going to take a one week vacation.

b.

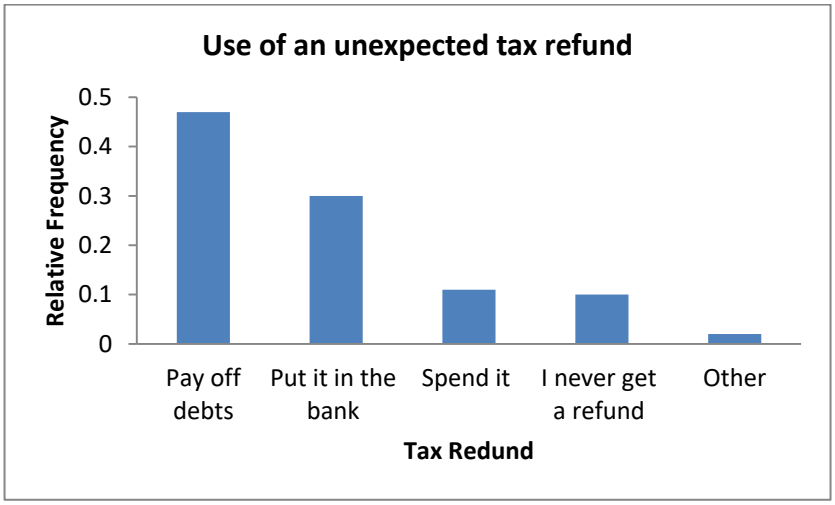
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57.

a.



Notice that the most frequent responses were regards to paying off debts or putting it in the bank.

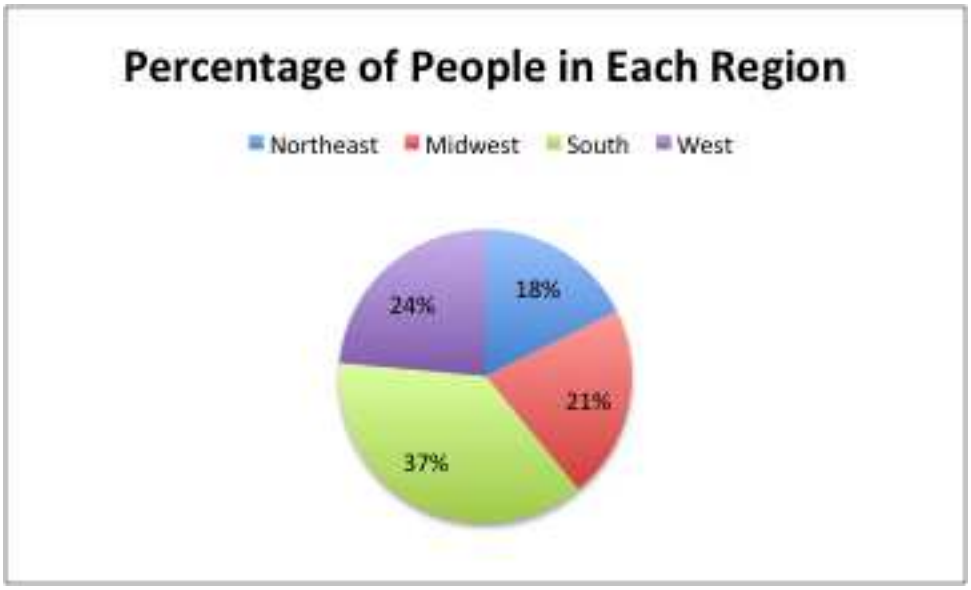
b. Since 11% of 1026 respondents said they would spend the refund, we find $0.11(1026) \approx 113$. Therefore, approximately 113 of the respondents would spend the tax refund.

58.

a. The pie chart is below.

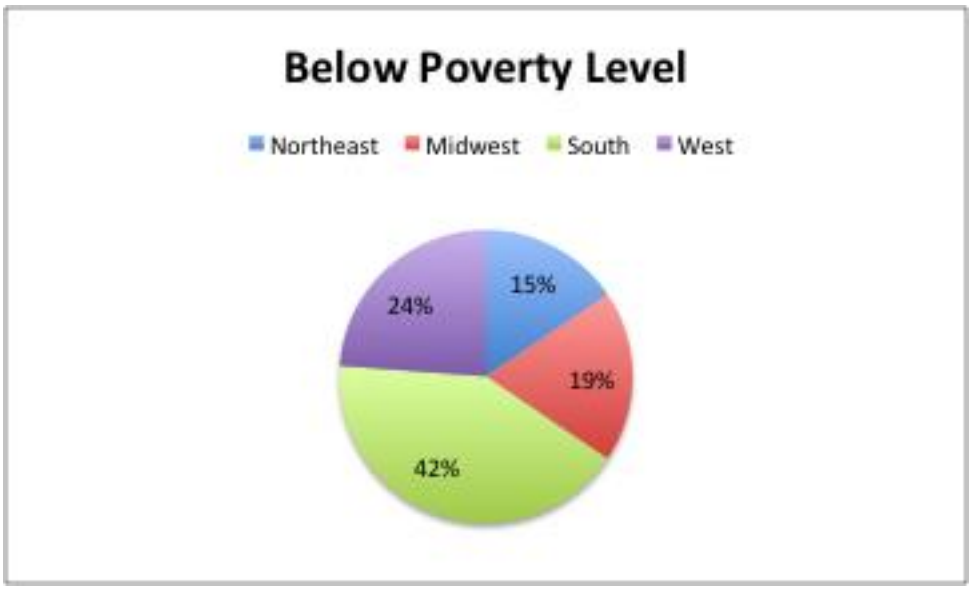
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The chart shows the highest percentage of people live in the South and the lowest percentage live in the Northeast.

b.



The chart shows the highest percentage of people living in poverty are in the South and the lowest percentage of people living in poverty are living in the Northeast. The percentage of people living in poverty in the South is higher than the percentage of people that live in South, and the percentage of people living in poverty in the Northeast is less than the percentage of people that live in the Northeast.

59.

a.

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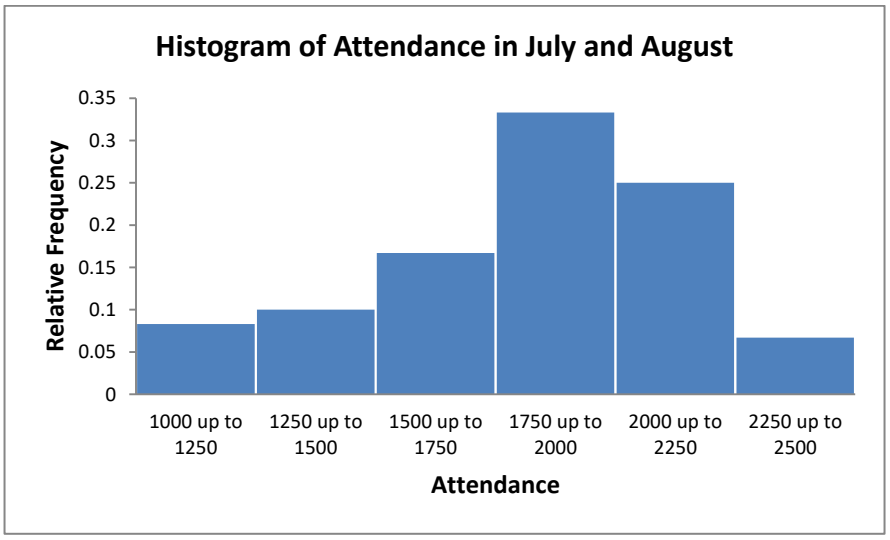
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Attendance	Relative Frequency	Cumulative Frequency	Cumulative Relative Frequency
1000 up to 1250	5/60 = 0.083	5	0.083
1250 up to 1500	6/60 = 0.100	5+6 = 11	0.083+0.100 = 0.183
1500 up to 1750	10/60 = 0.167	11+10 = 21	0.183+0.167 = 0.350
1750 up to 2000	20/60 = 0.333	21+20 = 41	0.350+0.333 = 0.683
2000 up to 2250	15/60 = 0.250	41+15 = 56	0.683+0.250 = 0.933
2250 up to 2500	4/60 = 0.067	56+4 = 60	0.933+0.067 = 1.000
	Total = 1.000		

b. The most likely attendance range is from 1,750 up to 2,000 with a 33% frequency; there were 41 times out of 60 that attendance was less than 2,000.

c. Attendance was at least 1,750 but less than 2,000 33.3% of the time; Attendance was less than 1,750 people 35% of the time; therefore, attendance was 1,750 or more 65% of the time.

d.



The distribution is not symmetric; it is negatively skewed.

60.

a.

Average MPG	Relative frequency	Cumulative Frequency	Cumulative Relative Frequency
15 up to 20	15/80 = 0.1875	15	0.1875
20 up to 25	30/80 = 0.3750	15 + 30 = 45	45/80 = 0.5625
25 up to 30	15/80 = 0.1875	45 + 15 = 60	60/80 = 0.7500

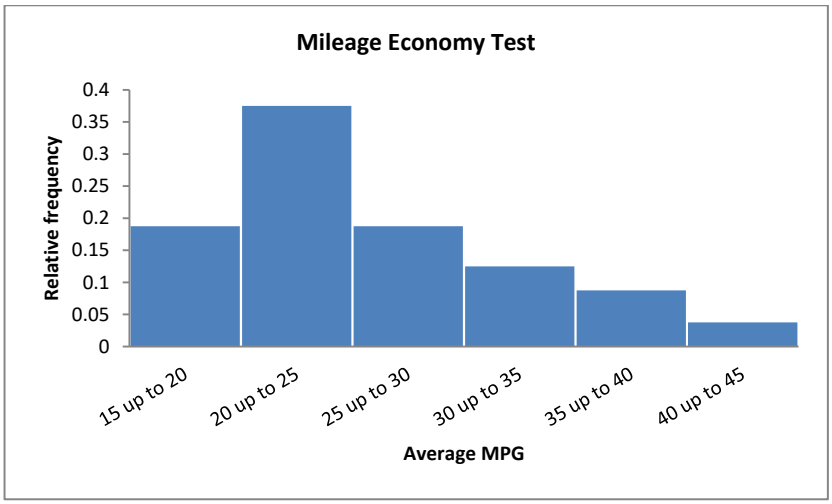
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30 up to 35	10/80 = 0.1250	60 + 10 = 70	70/80 = 0.8750
35 up to 40	7/80 = 0.0875	70 + 7 = 77	77/80 = 0.9625
40 up to 45	3/80 = 0.0375	77 + 3 = 80	80/80 = 1.0000
	Total = 1.0000		

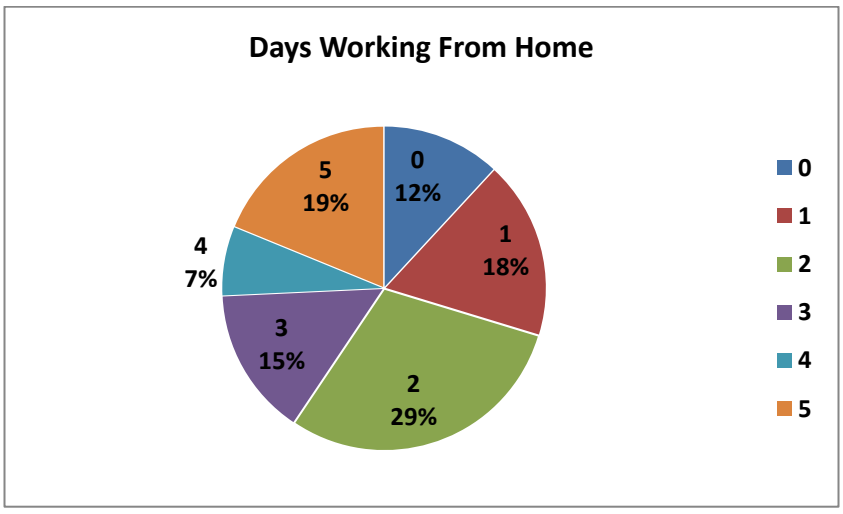
b. 60 cars got less than 30 mpg; 37.5% of the cars got at least 20 but less than 25 mpg; 87.5% of the cars got less than 35 mpg; Since 87.5% got less than 35 mpg, 12.5% of the cars got 35 mpg or more.

c.



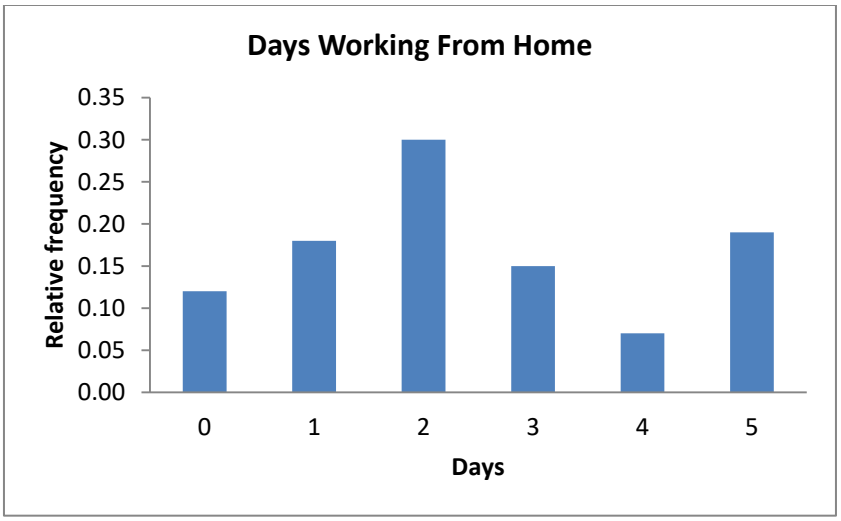
The distribution is not symmetric; it is positively skewed.

61.



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62.

a. There were 4 people out of 25 with a net worth greater than $20 billion. Since $4/25 = 0.16$, 16% of the wealthiest people had net worth greater than $20 billion.

b. Two people had a net worth less than $10 billion, which is $2/25 = 0.08$, or 8%. From the previous question, we know that 16% had a net worth greater than $20 billion. Therefore, $16\% + 8\% = 24\%$ *did not* have a net worth between $10 and $20 billion. Consequently, 76% had net worth between $10 billion and $20 billion.

c.

Stem	Leaf
3	6 6
4	4 7
5	3 3 4 6
6	0 1 5 5 6 7 7 9
7	0 1 3 3 3 7 8 9 9

The distribution is not symmetric; it is negatively skewed. The majority of ages range from the 60s to 70s. Table 2.16 shows the majority of ages to be in the 50s and 60s. Further, this diagram shows ages ranging from 36 to 79, whereas Table 2.16 has ages ranging from 36 to 90.

63.

Stem	Leaf
0	8 8 9 9
1	0 0 1 1 2 2 2 2 3 3 4 4 5 6 6 8 8 9 9 9

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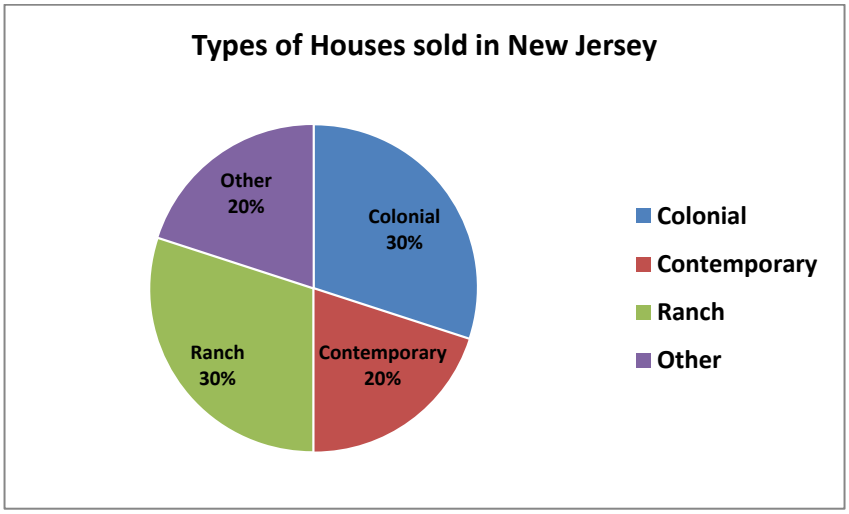
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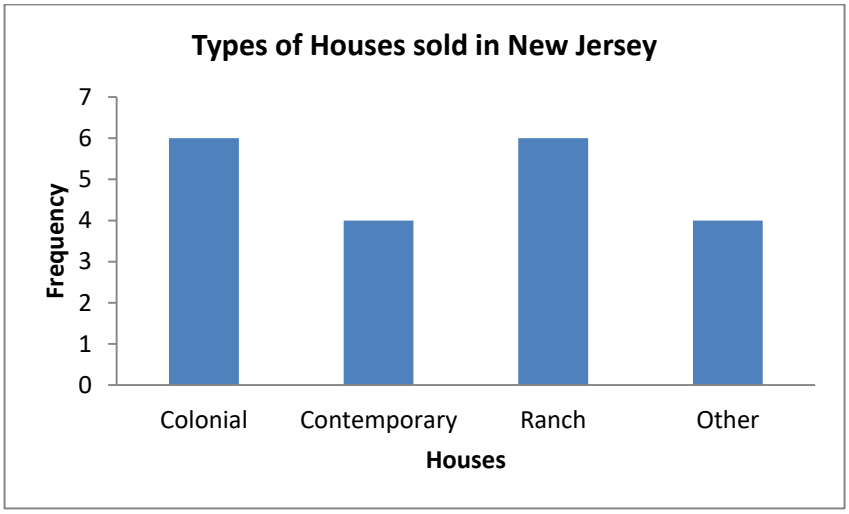
2	0 0 9 9
3	0 7

The vast majority of the PEG ratios fall in the 1 range. The diagram represents somewhat positively skewed distribution; there are a few firms with relatively high PEG ratios.

64.

a.





These charts show that the majority (60%) of houses were either Ranch or Colonial, but also 40% were either Contemporary or some other type.

b. To figure out how wide to make the classes, find the highest price and subtract the lowest price to get the range. That is \$568,000 - \$300,000 = \$268,000. Then, since we want 7 classes, divide the range by 7; 268,000/7 = \$38,386. However, for ease of interpretation, round to the

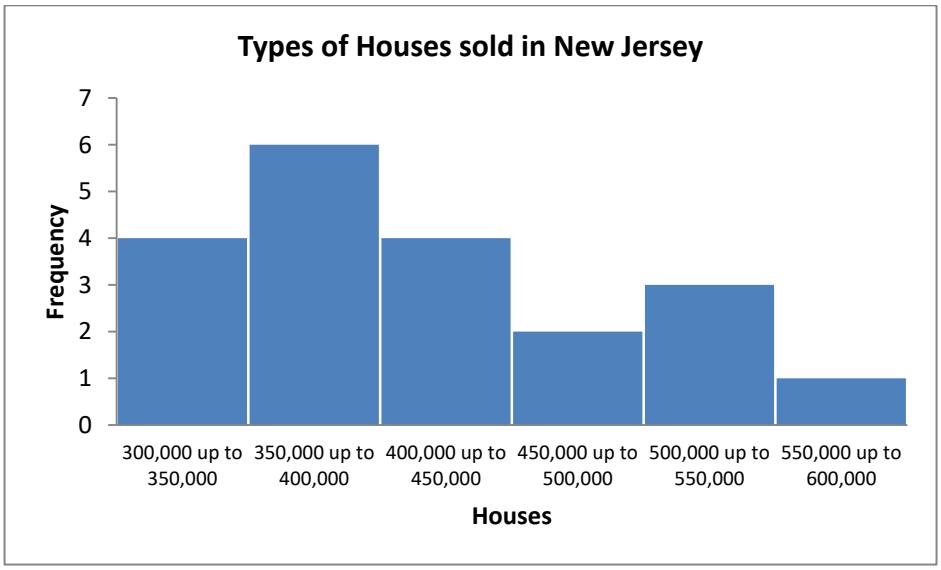
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most sensible number: $50,000. Therefore, our classes will have a width of $50,000, with a lower bound of the first class of $300,000.

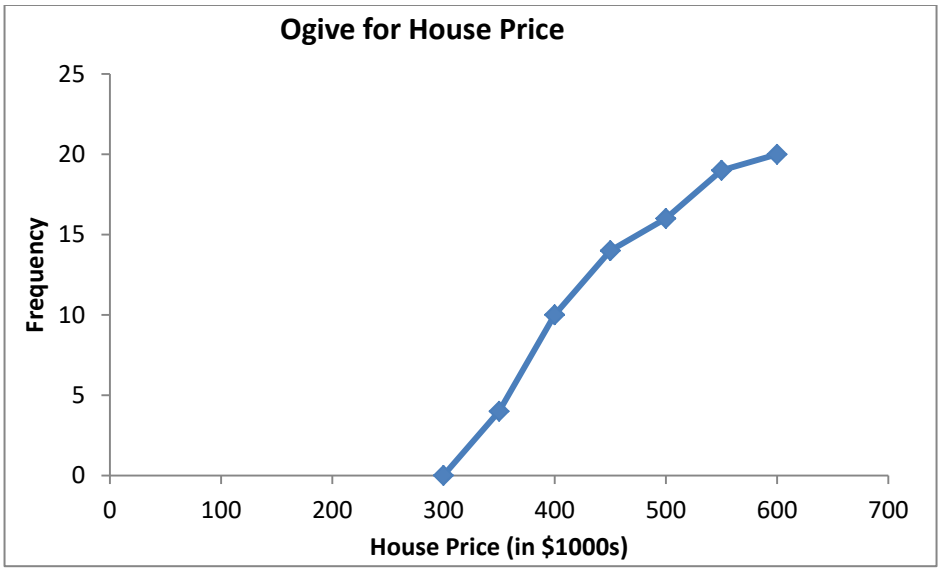
Classes	Frequency
300,000 up to 350,000	4
350,000 up to 400,000	6
400,000 up to 450,000	4
450,000 up to 500,000	2
500,000 up to 550,000	3
550,000 up to 600,000	1
	Total = 20

c.



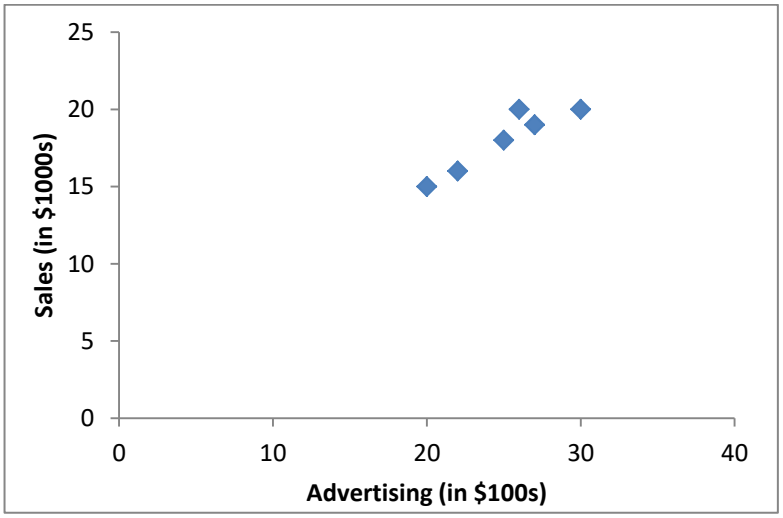
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The histogram shows that the most frequent house price is in the $350,000 up to $400,000 range. The ogive shows that the middle price (with a frequency of 10/20 or 50%) is about $400,000.

65.

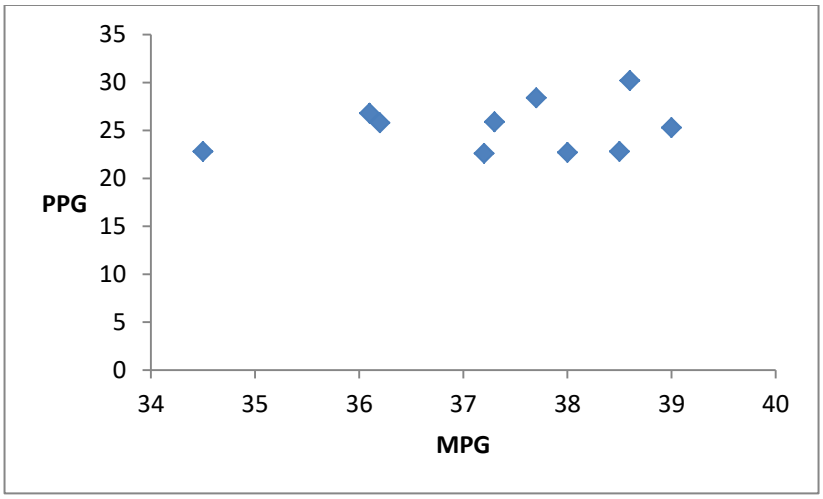


The scatter plot shows that the relation between Advertising and Sales is positive. The positive trend demonstrates that an increase in advertising will tend to increase sales.

66.

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The scatterplot reveals no clear relationship between PPG and MPG.

Case Study 2.1:

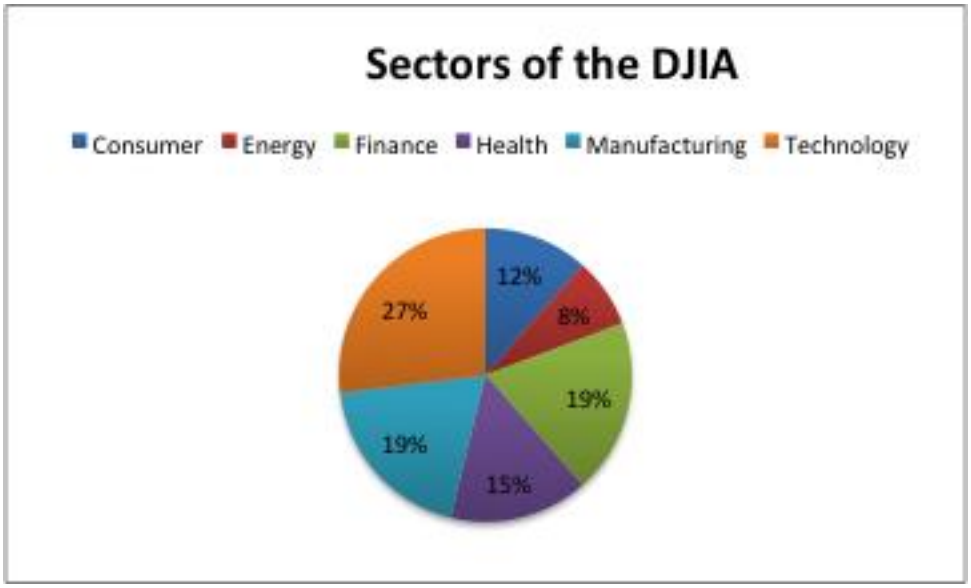
Frequency Distribution and Relative Frequency Distribution

Sector	Frequency	Relative Frequency
Consumer	3	0.233
Energy	2	0.067
Finance	5	0.167
Health	4	0.133
Manufacturing	5	0.167
Technology	7	0.233
Total	30	1.000

The pie chart is below.

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The sectors with the largest representations are the technology, manufacturing and finance sectors. The sector with the lowest representation is the energy sector.

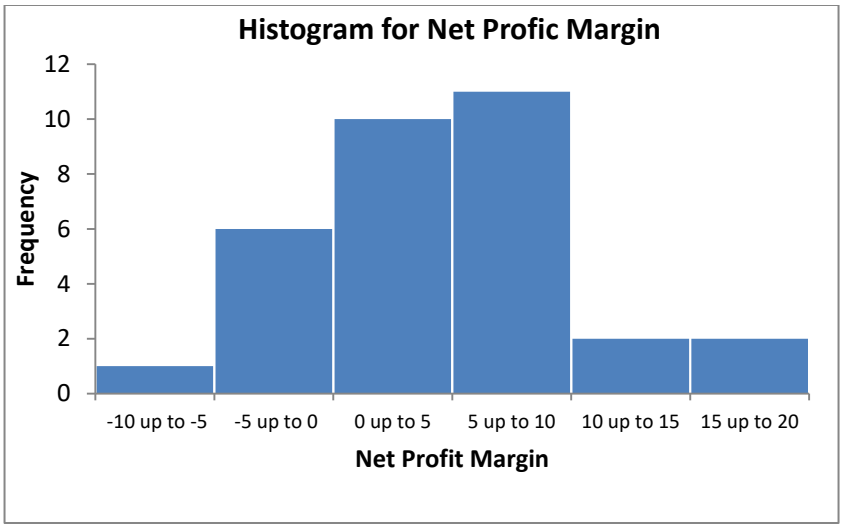
Case Study 2.2

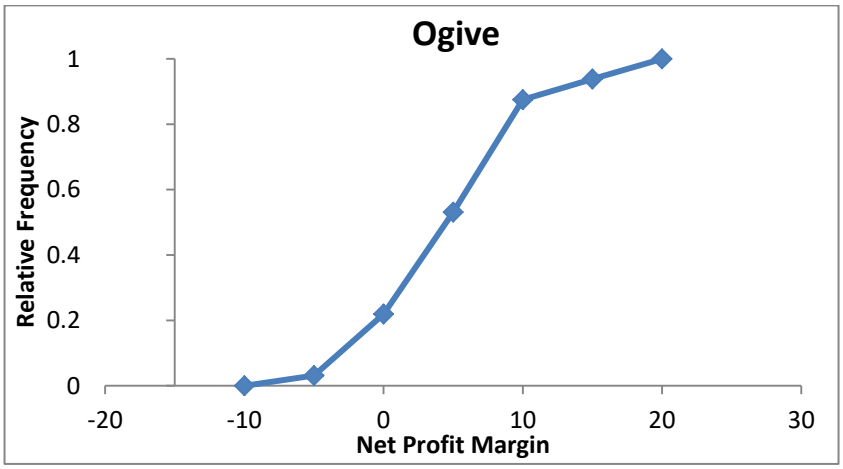
The net profit margin is a firm's net profit after taxes to revenue. It is measured in percentage, showing the percentage of net income per dollar in sales or other operating income.

Net Profit Margin	Frequency	Relative Frequency	Cumulative Frequency	Cumulative Relative Frequency
-10% up to -5%	1	1/32 = 0.031	1	1/32 = 0.031
-5 up to 0	6	6/32 = 0.188	7	7/32 = 0.219
0 up to 5	10	10/32 = 0.313	17	17/32 = 0.531
5 up to 10	11	11/32 = 0.344	28	28/32 = 0.875
10 up to 15	2	2/32 = 0.063	30	30/32 = 0.938
15 up to 20	2	2/32 = 0.063	32	32/32 = 1.000
	Total = 32	Total ≈ 1		

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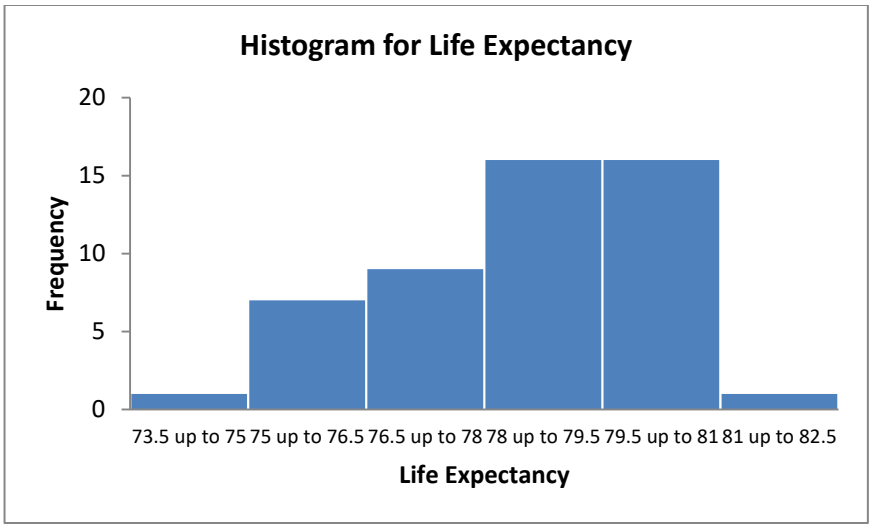
The data tends to cluster between 0% and 10%, as shown in the histogram. The net profit margins range from -5.19% to 19.95%. Approximately 53% of the firms have a net profit margin below 5%.

Case Study 2.3

Life Expectancy	Frequency	Relative Frequency	Cumulative Frequency	Cumulative Relative Frequency
73.5 up to 75	1	1/50=0.02	1	1/50=0.02
75 up to 76.5	7	7/50=0.14	8	8/50=0.16
76.5 up to 78	9	9/50=0.18	17	17/50=0.34
78 up to 79.5	16	16/50=0.32	33	33/50=0.66
79.5 up to 81	16	16/50=0.32	49	49/50=0.98
81 up to 82.5	1	1/50=0.02	50	50/50=1.00

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The data tends to cluster between 78 and 81, as shown in the histogram. The distribution is negatively skewed.

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