

***Essentials of Business Statistics 3rd edition Jaggia
Solutions Manual***

SKU: 9781264098347-SOLUTIONS

Chapter 2. Data Visualization

Solutions

1.

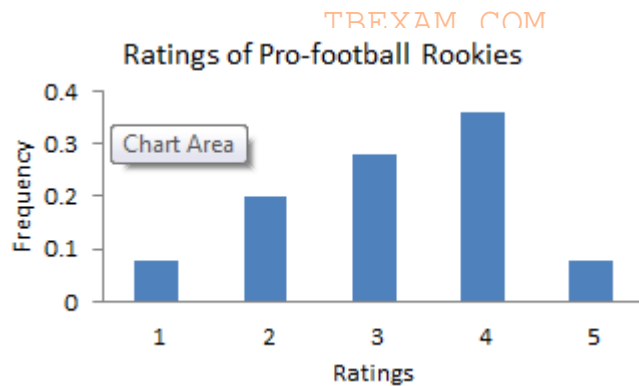
- a. 22 (18 + 4) out of 50 rookies received a rating of 4 or better; 14 (10 + 4) out of 50 rookies received a rating of 2 or worse.

b.

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

8% of the rookies received a rating of 5.

c.



The rating of 4 has the highest frequency; the distribution is not symmetric, rather it is negatively skewed.

2.

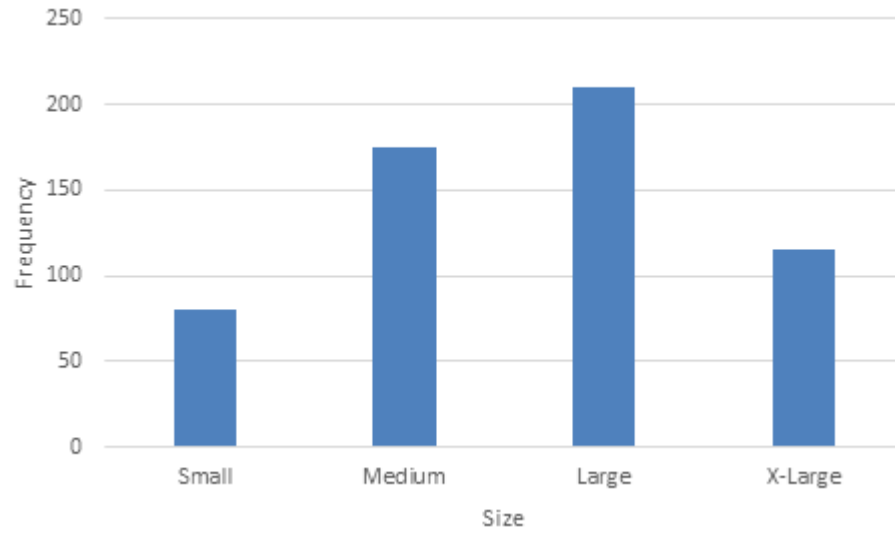
a.

Size	Frequency	Relative Frequency
Small	80	$80 / 580 = 0.138$
Medium	175	0.302
Large	210	0.362
X-Large	115	0.198

The proportion of the sales for medium-sized shirts was 0.302.

Chapter 02 – Data Visualization

b.



Sales of large-sized shirts had the highest frequency and sales of small-sized shirts had the lowest frequency.

3.

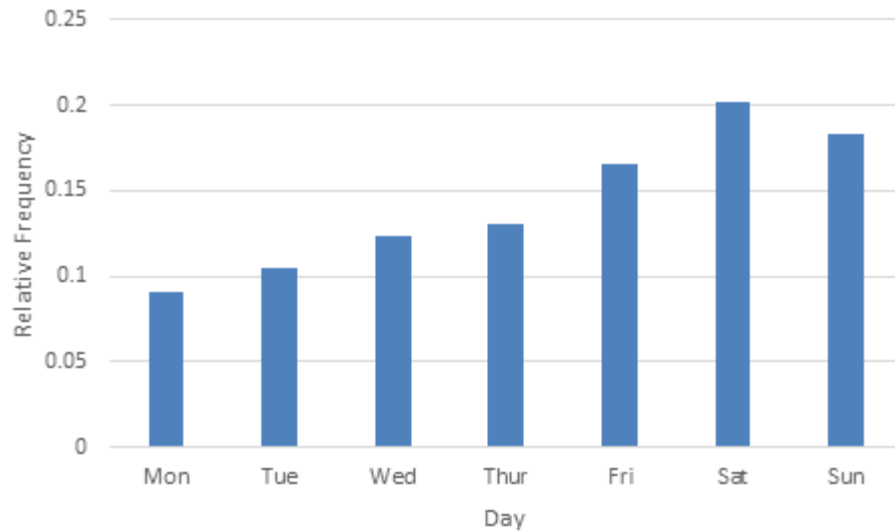
a.

Day	Frequency	Relative Frequency
Mon	2504	$2504 / 27500 = 0.091$
Tue	2880	0.105
Wed	3402	0.124
Thur	3566	0.130
Fri	4576	0.166
Sat	5550	0.202
Sun	5022	0.183

The proportion of purchases that occurred on Wednesday was 0.124.

b.

Chapter 02 – Data Visualization



The retailer saw the highest proportion of sales on the weekend. The lowest proportion of sales occurred on Monday.

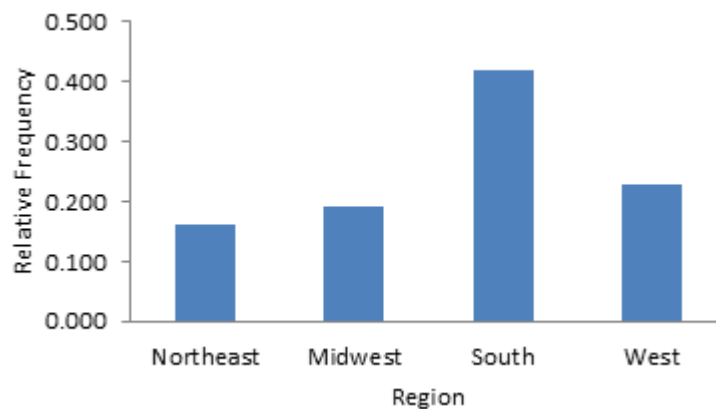
4.

a.

Region	Number of People	Relative Frequency
Northeast	6,373	$6,373 / 39,698 = 0.161$
Midwest	7,647	0.193
South	16,609	0.418
West	9,069	0.228

19.3% of people in the Midwest are living below the poverty level.

b.



The South has the highest relative frequency as compared to the other three regions, which are roughly equal.

Chapter 02 – Data Visualization

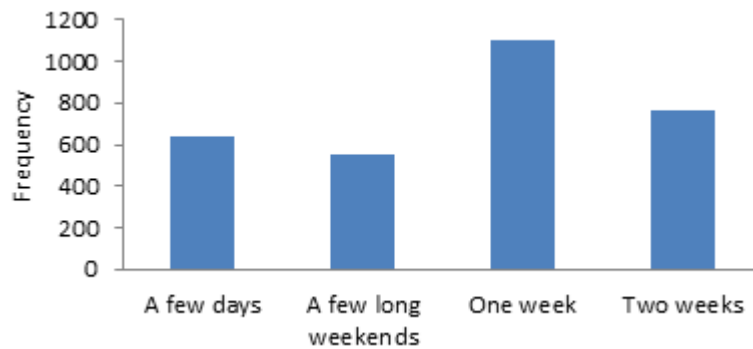
5.

a.

Response	Relative Frequency	Frequency
A few days	0.21	$0.21(3057) = 642$
A few long weekends	0.18	$0.18(3057) = 550$
One week	0.36	$0.36(3057) = 1,101$
Two weeks	0.25	$0.25(3057) = 764$

Approximately 1,101 people are going to take a one-week vacation.

b.



“One week” has the highest frequency as compared to the other categories, which are roughly equal.

6.

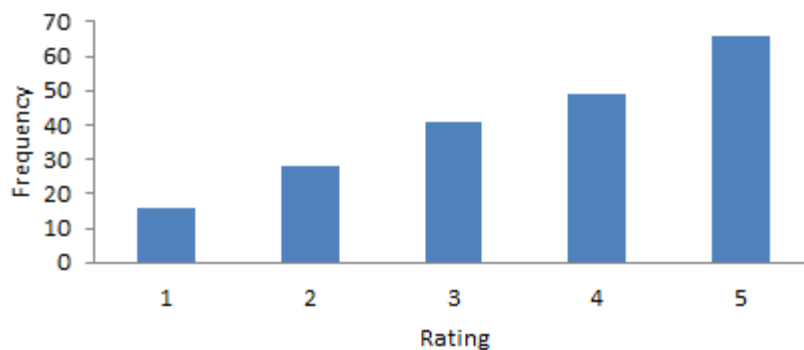
a.

Rating	Frequency
1	16
2	28
3	41
4	49
5	66

A rating of 5 has the highest frequency

b.

Chapter 02 – Data Visualization



The higher ratings have the higher frequencies.

7.

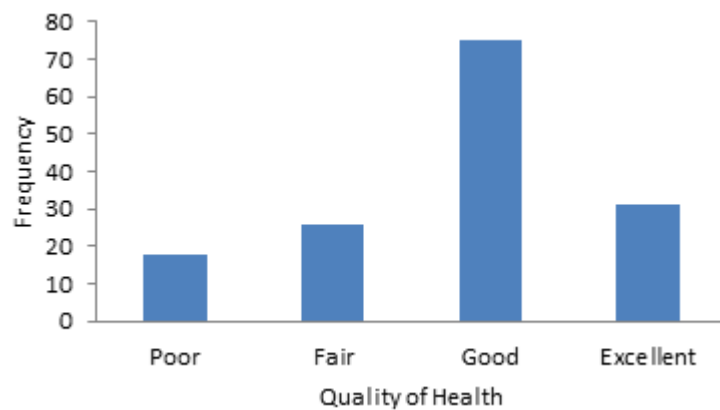
a.

Quality of Health	Frequency
Poor	18
Fair	26
Good	75
Excellent	31

Good is the most common response.

TBEXAM.COM

b.



Patients seem to be healthy, with the majority rated Good or Excellent.

8.

a.

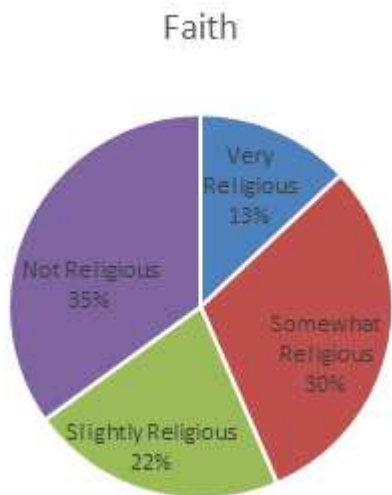
Faith	Frequency
Very Religious	78
Somewhat Religious	183
Slightly Religious	129

Chapter 02 – Data Visualization

Faith	Frequency
Not Religious	210

Not Religious is the most common response.

b.



$210/600 = 0.35$; about 35% responded “Not Religious” which is consistent with the earlier study.

TBEXAM.COM

9.

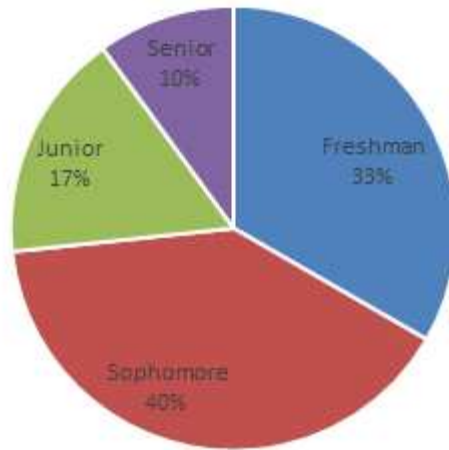
a.

Status	Frequency	Relative Frequency
Freshman	20	0.33
Sophomore	24	0.40
Junior	10	0.17
Senior	6	0.10

There are 20 freshmen in her class; 40% of the class are sophomores.

b.

Chapter 02 – Data Visualization



Freshmen and sophomores make up the majority of the class, 33% and 40%, respectively; 17% of the class are juniors and the remaining 10% are seniors.

10.

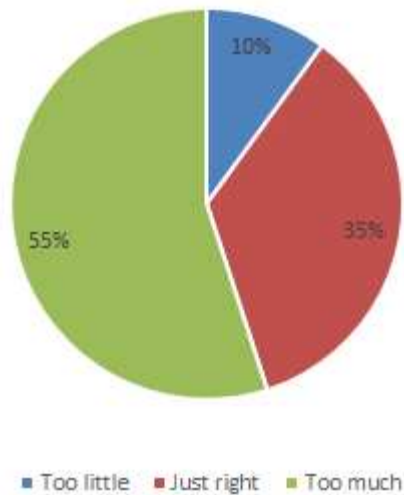
a.

Response	Frequency	Relative Frequency
Too little	40	0.10
Just right	140	0.35
Too much	220	0.55

220 – number of respondents who felt that parents do too much for adult children;
 0.10 – proportion of respondents who felt that parents do too little for adult children

b.

Chapter 02 – Data Visualization



The majority of respondents, 55%, felt that parents do too much for their adult children; only 10% of respondents felt that parents do too little for their adult children.

11.

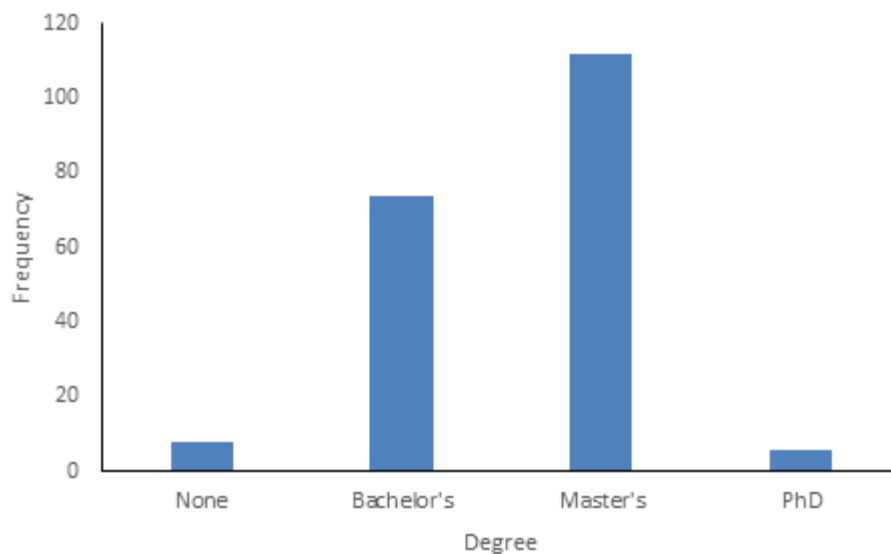
a.

Degree	Frequency	Relative Frequency
None	8	0.04
Bachelor's	74	0.37
Master's	112	0.56
PhD	6	0.03

Yes, out of 200 CEOs more than half have advance degrees ($112 + 6 = 118$); only 4% of CEOs do not have at least a Bachelor's degree.

b.

Chapter 02 – Data Visualization



The majority of CEOs have a Bachelor's or a Master's degree. Very few CEOs have no degree or a PhD.

12.

Interval	Frequency	Relative Frequency	Cumulative Frequency	Cumulative Relative Frequency
$1,000 < x \leq 1,100$	22	$22 / 120 = 0.183$	22	$22 / 120 = 0.183$
$1,100 < x \leq 1,200$	38	0.317	$22 + 38 = 60$	$60 / 120 = 0.500$
$1,200 < x \leq 1,300$	44	0.367	104	0.867
$1,300 < x \leq 1,400$	16	0.133	120	1.000

- a. 0.317
- b. 104
- c. 0.867; 0.133

13.

Interval	Frequency	Relative Frequency	Cumulative Frequency	Cumulative Relative Frequency
$10 < x \leq 20$	12	$12 / 56 = 0.214$	12	$12 / 56 = 0.214$
$20 < x \leq 30$	15	0.268	$12 + 15 = 27$	$27 / 56 = 0.482$
$30 < x \leq 40$	25	0.446	52	0.928
$40 < x \leq 50$	4	0.071	56	1.000

- a. 0.268

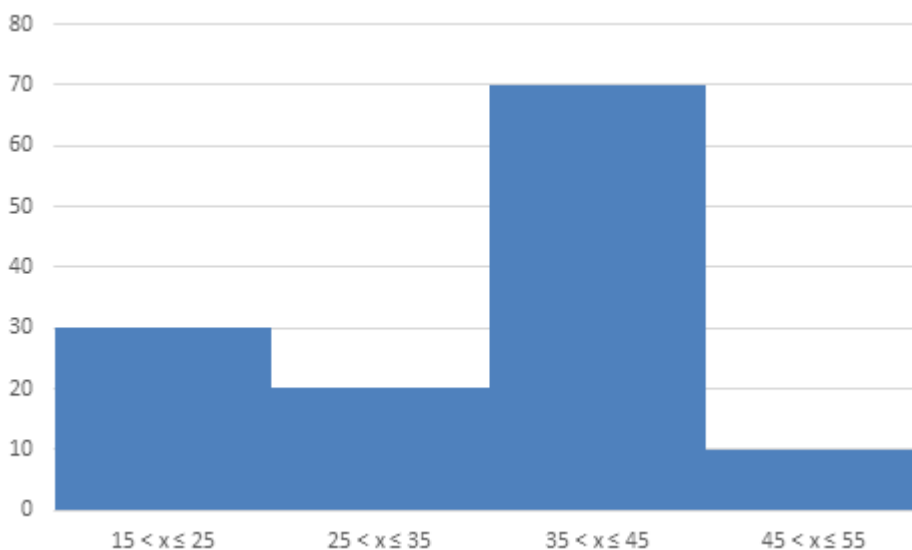
Chapter 02 – Data Visualization

- b. 52
c. 0.482

14.

Interval	Cumulative Frequency	Frequency	Cumulative Relative Frequency
$15 < x \leq 25$	30	30	$30/130 = 0.231$
$25 < x \leq 35$	50	$50 - 30 = 20$	$50/130 = 0.385$
$35 < x \leq 45$	120	$120 - 50 = 70$	0.923
$45 < x \leq 55$	130	$130 - 120 = 10$	1.000

- a. 70
b. 0.923
c. The distribution is not symmetric.



15.

Interval	Relative Frequency	Frequency	Cumulative Frequency	Cumulative Relative Frequency
$-20 < x \leq -10$	0.04	$0.04 \times 50 = 2$	2	0.04
$-10 < x \leq 0$	0.28	14	$2 + 14 = 16$	$0.04 + 0.28 = 0.32$
$0 < x \leq 10$	0.26	13	29	0.58
$10 < x \leq 20$	0.22	11	40	0.80
$20 < x \leq 30$	0.20	10	50	1.00

Chapter 02 – Data Visualization

- a. 14
b. 40

16.

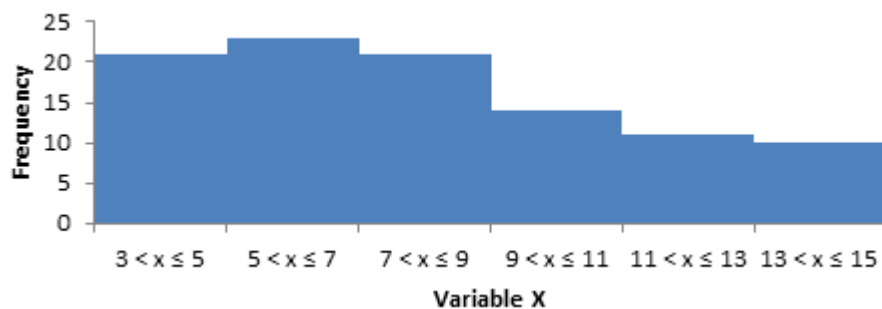
Interval	Cumulative Relative Frequency	Relative Frequency
$150 < x \leq 200$	0.10	0.10
$200 < x \leq 250$	0.35	$0.35 - 0.10 = 0.25$
$250 < x \leq 300$	0.70	0.35
$300 < x \leq 350$	1.00	0.30

- a. 0.70
b. 0.35

17.

Interval	Frequency	Relative Frequency
$3 < x \leq 5$	21	0.21
$5 < x \leq 7$	23	0.23
$7 < x \leq 9$	21	0.21
$9 < x \leq 11$	14	0.14
$11 < x \leq 13$	11	0.11
$13 < x \leq 15$	10	0.10

- a. 21
b. 0.23
c. The distribution is not symmetric.



18.

Chapter 02 – Data Visualization

Interval	Frequency	Relative Frequency	Cumulative Relative Frequency
$-10 < x \leq 0$	9	0.09	0.09
$0 < x \leq 10$	47	0.47	0.56
$10 < x \leq 20$	31	0.31	0.87
$20 < x \leq 30$	8	0.08	0.95
$30 < x \leq 40$	5	0.05	1

- a. 47
b. 0.31; 0.13

19.

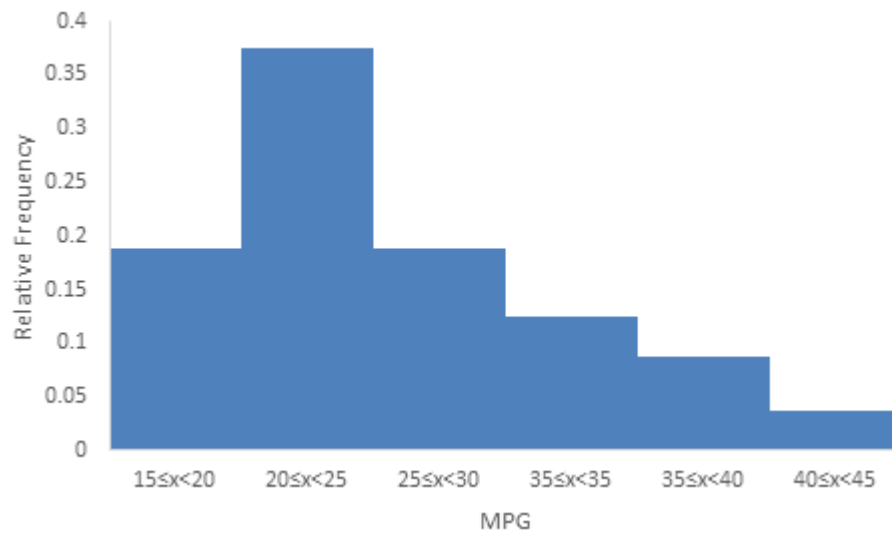
a.

Average MPG	Relative frequency
$15 \leq x < 20$	$15/80 = 0.1875$
$20 \leq x < 25$	0.3750
$25 \leq x < 30$	0.1875
$30 \leq x < 35$	0.1250
$35 \leq x < 40$	0.0875
$40 \leq x < 45$	0.0375

0.375 of the cars got at least 20 but less than 25 mpg; 0.875 of the cars got less than 35 mpg. Since 0.875 got less than 35 mpg, 0.125 of the cars got 35 mpg or more.

Chapter 02 – Data Visualization

b.



The distribution is not symmetric; it is positively skewed.

20.

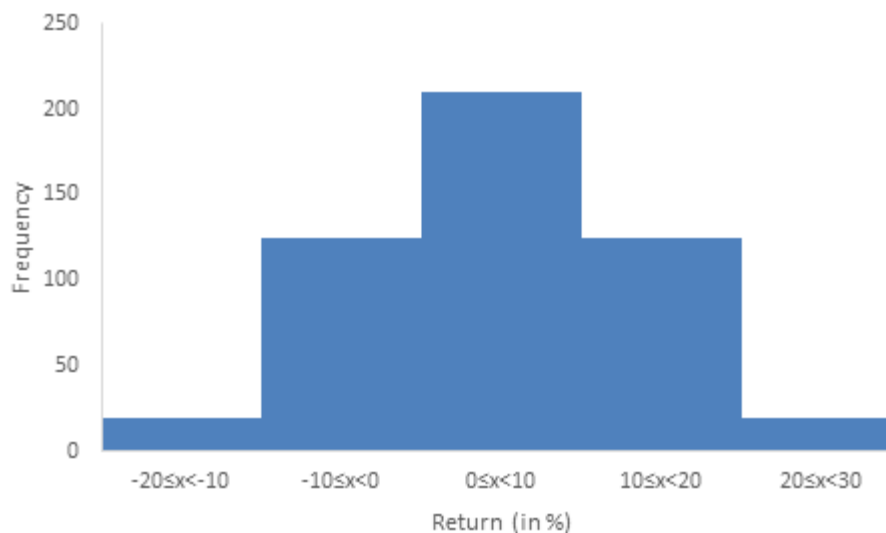
a.

Return (%)	Frequency
$-20 \leq x < -10$	$0.04(500) = 20$
$-10 \leq x < 0$	125
$0 \leq x < 10$	210
$10 \leq x < 20$	125
$20 \leq x < 30$	20

125 stocks had returns of at least 10% but less than 20%.

b.

Chapter 02 – Data Visualization



The distribution is symmetric.

21.

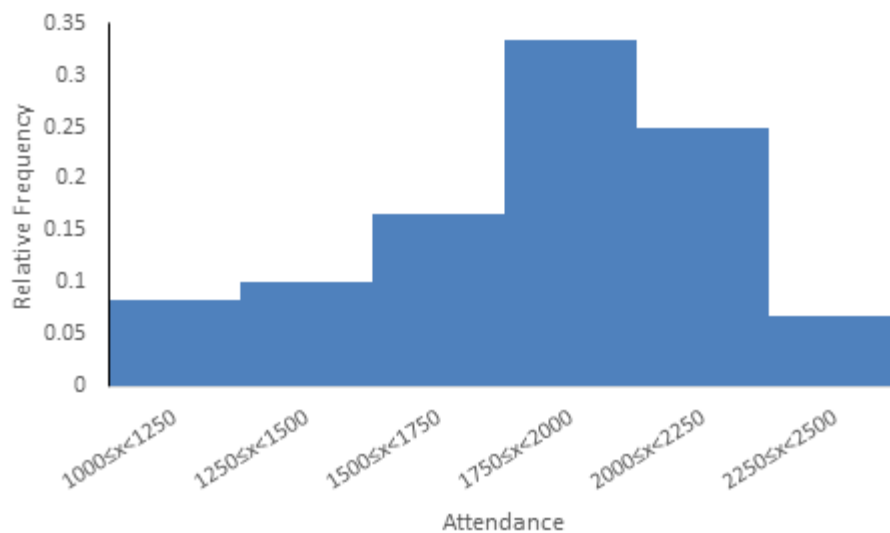
a.

Attendance	Relative Frequency
$1,000 \leq x < 1,250$	$5/60 = 0.083$
$1,250 \leq x < 1,500$	0.100
$1,500 \leq x < 1,750$	0.167
$1,750 \leq x < 2,000$	0.333
$2,000 \leq x < 2,250$	0.250
$2,250 \leq x < 2,500$	0.067

The proportion of time that attendance was at least 1,750 but less than 2,000 was 0.33; the proportion of time that attendance was less than 1,750 was 0.35; therefore, the proportion of time that attendance was 1,750 or more was 0.65.

b.

Chapter 02 – Data Visualization



The distribution is not symmetric; it is negatively skewed.

22.

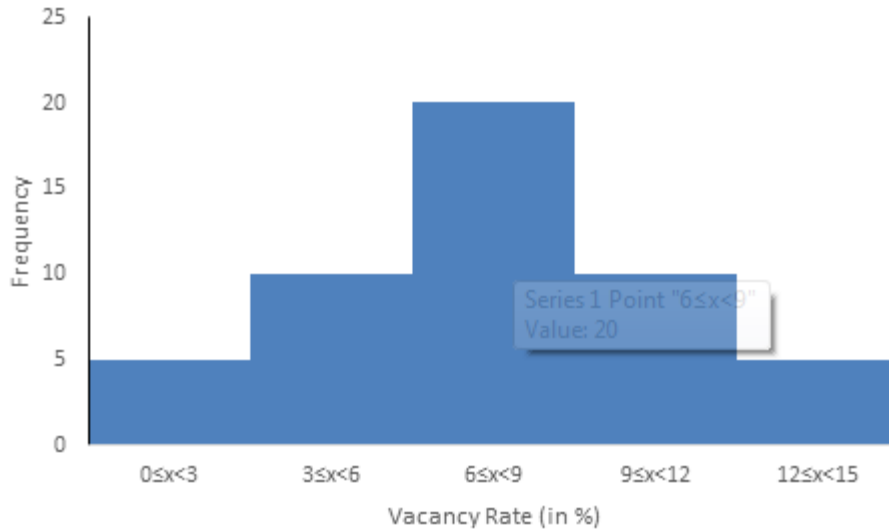
a.

Vacancy Rate (%)	Frequency
$0 \leq x < 3$	$0.10(50) = 5$
$3 \leq x < 6$	10
$6 \leq x < 9$	20
$9 \leq x < 12$	10
$12 \leq x < 15$	5

Twenty cities had vacancy rates that were at least 6% but less than 9%. Fifteen cities had a vacancy rate of at least 9%.

b.

Chapter 02 – Data Visualization



The distribution is symmetric.

23.

- No. The distribution is not symmetric. It is positively skewed.
- Forty-four percent of the states had median household income between \$45,000 and \$55,000.
- Sixty-six percent of the states had median household income between \$35,000 and \$55,000.

TBEXAM.COM

24.

- No. The distribution is not symmetric. It is positively skewed.
- Over this time period, the stock price was between \$50 and \$250.
- The \$100 up to \$150 interval has the highest relative frequency, which is about 0.44.

25.

- No. The distribution is not symmetric. It is positively skewed.
- Three (0.10×30) of the portfolio managers earned between \$2,000,000 and \$2,400,000.
- About 26 ($0.43 \times 30 + 0.43 \times 30 = 25.8$) of the portfolio managers earned between \$1,200,000 and \$2,000,000.

26.

a.

Expenditures	Frequency
$400 < x \leq 700$	5
$700 < x \leq 1000$	14
$1000 < x \leq 1300$	33

Chapter 02 – Data Visualization

Expenditures	Frequency
$1300 < x \leq 1600$	25
$1600 < x \leq 1900$	19
$1900 < x \leq 2200$	4

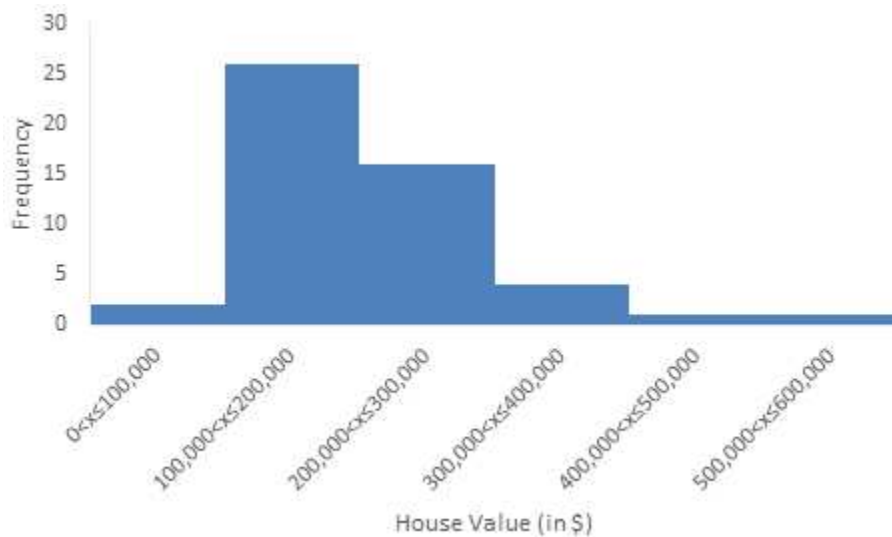
14 customers spent between \$701 and \$1,000.

- b. 52 customers spent \$1,300 or less; 48 customers spent more than \$1,300.

27.

a.

House Value	Frequency
$0 < x \leq 100,000$	2
$100,000 < x \leq 200,000$	26
$200,000 < x \leq 300,000$	16
$300,000 < x \leq 400,000$	4
$400,000 < x \leq 500,000$	1
$500,000 < x \leq 600,000$	1



The interval $100,000 < x \leq 200,000$ has the highest frequency. Forty-four states ($2+26+16=44$) have median house values of \$300,000 or less.

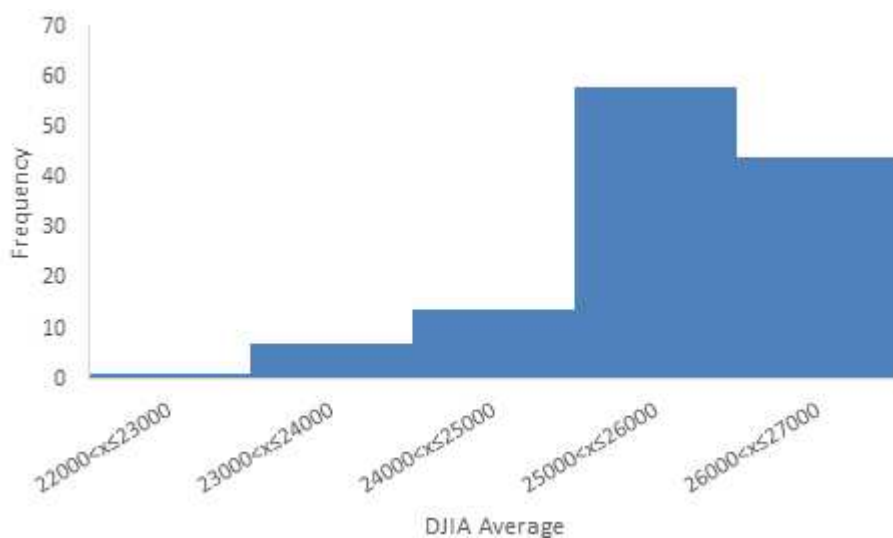
- b. No, the distribution is not symmetric. It is positively skewed.

28.

a.

Chapter 02 – Data Visualization

DJIA	Frequency
$22000 < x \leq 23000$	1
$23000 < x \leq 24000$	7
$24000 < x \leq 25000$	14
$25000 < x \leq 26000$	58
$26000 < x \leq 27000$	44



The DJIA was more than 26,000 on 44 days in the first half of 2019.

b.

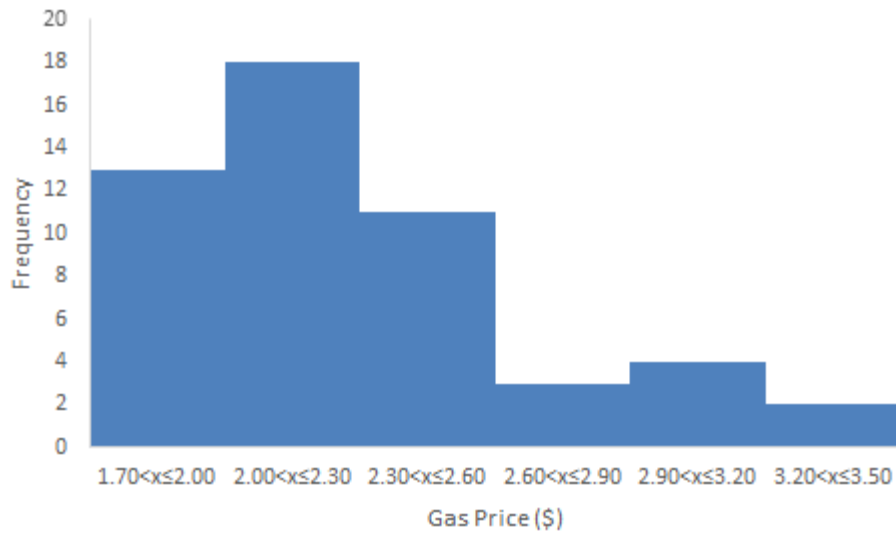
The distribution is not symmetric; it is negatively skewed.

29.

a.

Gas Price	Frequency
$1.70 < x \leq 2.00$	13
$2.00 < x \leq 2.30$	18
$2.30 < x \leq 2.60$	11
$2.60 < x \leq 2.90$	3
$2.90 < x \leq 3.20$	4
$3.20 < x \leq 3.50$	2

Chapter 02 – Data Visualization



The interval $2.00 < x \leq 2.30$ has the highest frequency. Nine states ($3+4+2=9$) have average gas prices that are greater than \$2.60.

- b. No, the distribution is not symmetric. It is positively skewed.

30.

a.

TBEXAM.COM

Salary	Frequency	Relative Frequency
$0 < x \leq 50,000$	29	0.29
$50,000 < x \leq 100,000$	41	0.41
$100,000 < x \leq 150,000$	18	0.18
$150,000 < x \leq 200,000$	11	0.11
$200,000 < x \leq 250,000$	1	0.01

18 employees earn between \$100,000 and \$150,000; the proportion that earns at most \$200,000 is 0.99.

b.

Experience	Frequency	Relative Frequency
$0 < x \leq 6$	22	0.22
$6 < x \leq 12$	19	0.19
$12 < x \leq 18$	20	0.20
$18 < x \leq 24$	16	0.16

Chapter 02 – Data Visualization

Experience	Frequency	Relative Frequency
$24 < x \leq 30$	23	0.23

19 employees have between 6 and 12 years of experience; the proportion of employees that has more than 24 years of experience is 0.23.

31.

- 542 units passed inspection; 88 units failed inspection
- 129 of the inspectors had high experience
- 0.2667
- 0.0730

32.

- There were 378 total shipments.
- 46 shipments were defective.
- 80 shipments were from Vendor II.
- 14 shipments were from Vendor I and were defective.

33.

	Sex		
Personality	Female	Male	Total
Analyst	55	61	116
Diplomat	164	160	324
Explorer	194	210	404
Sentinel	79	77	156
Total	492	508	1,000

- 492; Explorers
- 0.194; 0.160

34.

a.

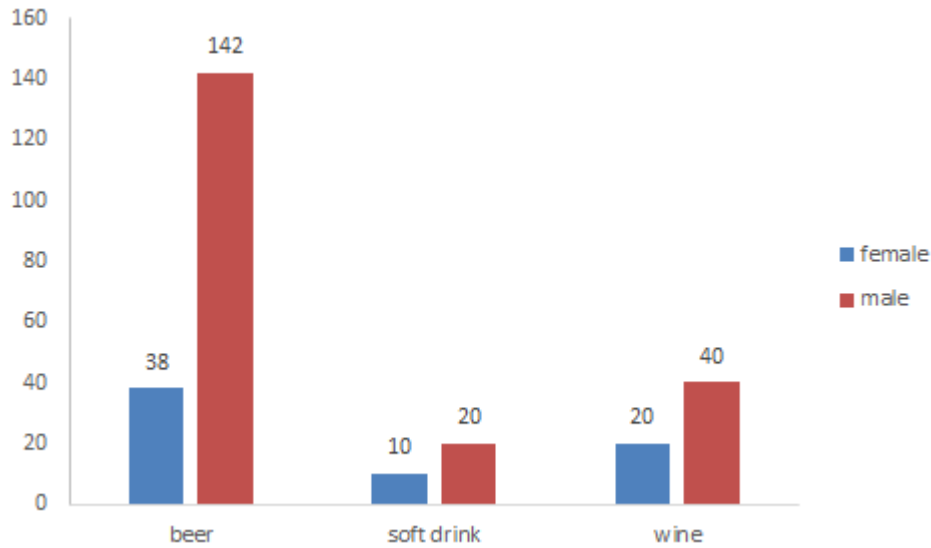
	Sex		
Drink Choice	female	male	Total
beer	38	142	180
soft drink	10	20	30
wine	20	40	60
Total	68	202	270

Chapter 02 – Data Visualization

202 of the customers were male; 60 of the customers drank wine.

b. $142/202 = 0.7030$; $38/68 = 0.5588$.

c.



The clustered column chart shows that beer is the popular drink at this bar, followed by wine and then soft drinks. Both men and women are more likely to choose beer over the other two options.

35.

a.

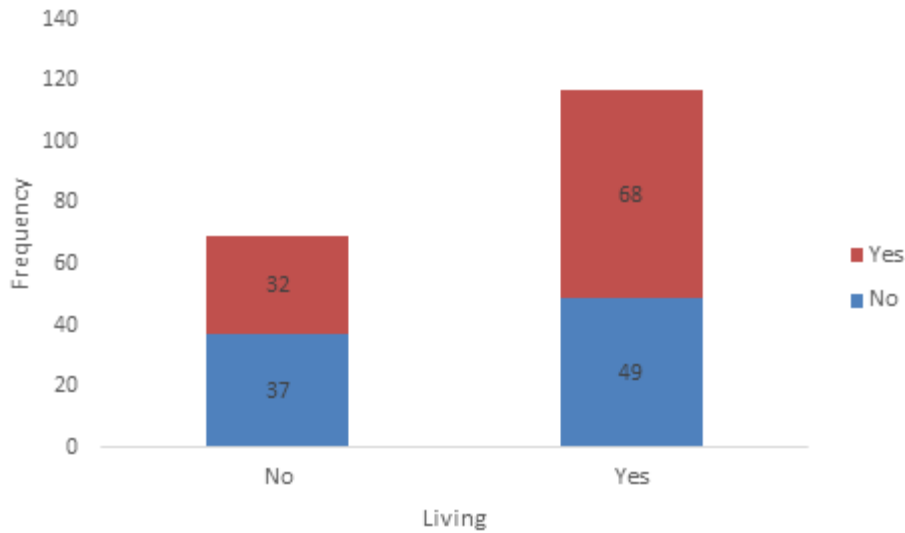
	Experimental_ Drug		
Living	No	Yes	Total
No	37	32	69
Yes	49	68	117
Total	86	100	186

100 of the patients received the experimental drug; 117 of the patients were still alive after one year.

b. $49/86 = 0.5698$; $68/100 = 0.6800$.

c.

Chapter 02 – Data Visualization



The stacked column chart shows that, of the 186 terminally ill patients, more were living as opposed to dead. Also, it appears that those who received the experimental drug were more likely to survive than those who did not receive the experimental drug ($0.68 > 0.57$).

36.

a.

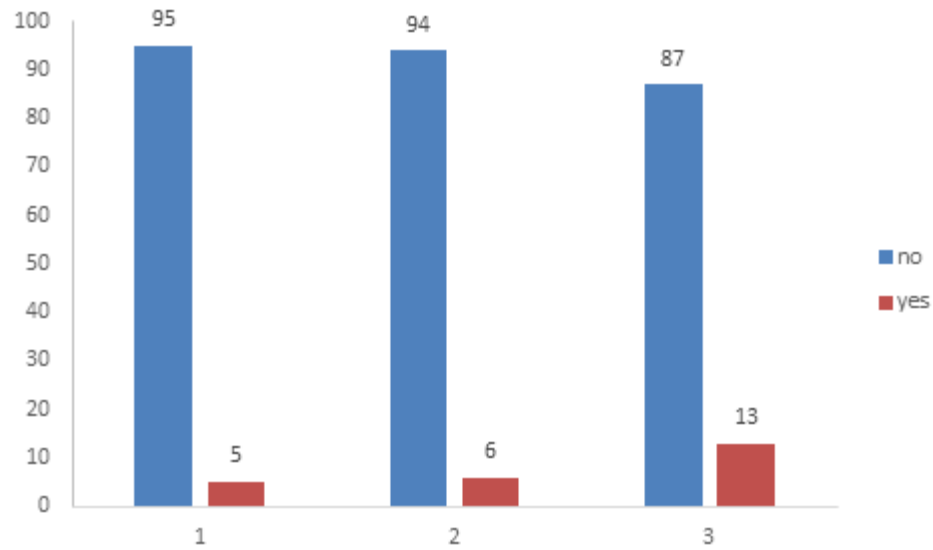
	Shift			
Defective	1	2	3	Total
no	95	94	87	276
Yes	5	6	13	24
Total	100	100	100	300

Five components from shift 1 were defective; 94 components from shift 2 were not defective.

b. $6/24 = 0.2500$; $13/24 = 0.5417$; components constructed during shift 3 seem to be defective at a higher rate.

c.

Chapter 02 – Data Visualization



Defect rates seem to be highest in shift 3.

37.

a.

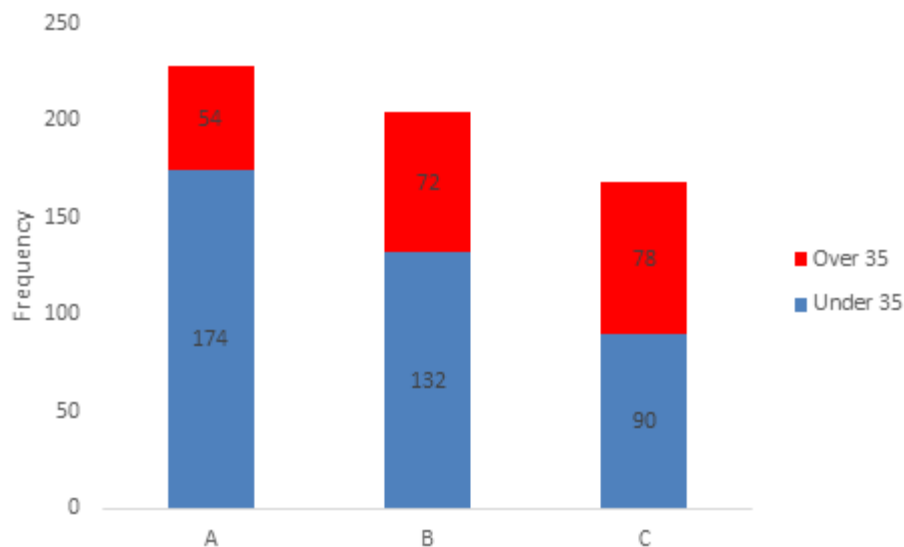
	Under 35		
Brand	no	Yes	Total
A	54	174	228
B	72	132	204
C	78	90	168
Total	204	396	600

228 purchases were from brand A; 396 purchases were from customers under 35.

b. $174/396=0.4394$; $132/396=0.3333$; $90/396=0.2273$; The data suggests that customers under 35 prefer brand A.

c.

Chapter 02 – Data Visualization



Younger customers seem to prefer A over B, and B over C, while older Customers seem to prefer C over B, and B over A

38.

a.

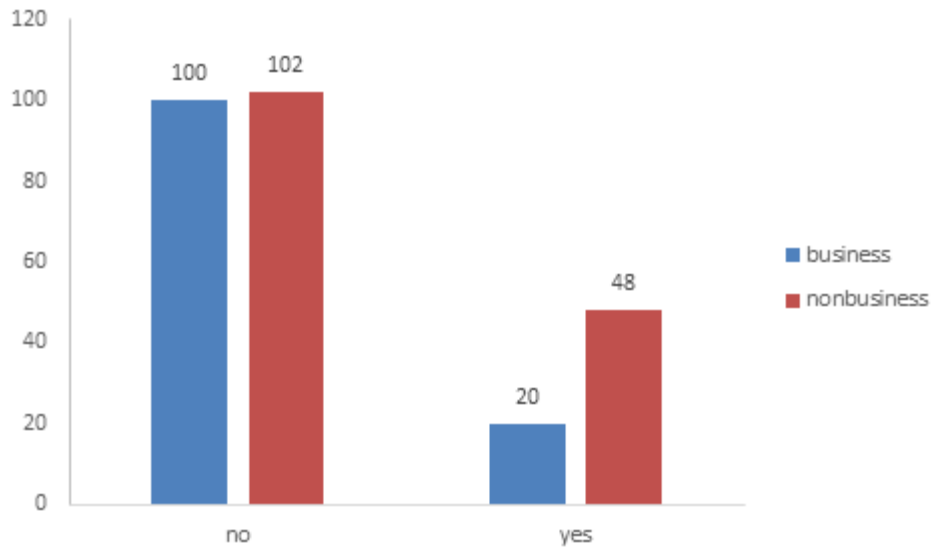
	Major		
Study hard	business	nonbusiness	Total
no	100	102	202
yes	20	48	68
Total	120	150	270

120 students are business majors; 68 students study hard.

b. $20/120 = 0.1667$; $48/150 = 0.3200$; The data suggest that nonbusiness majors are more likely to study hard, which supports the report.

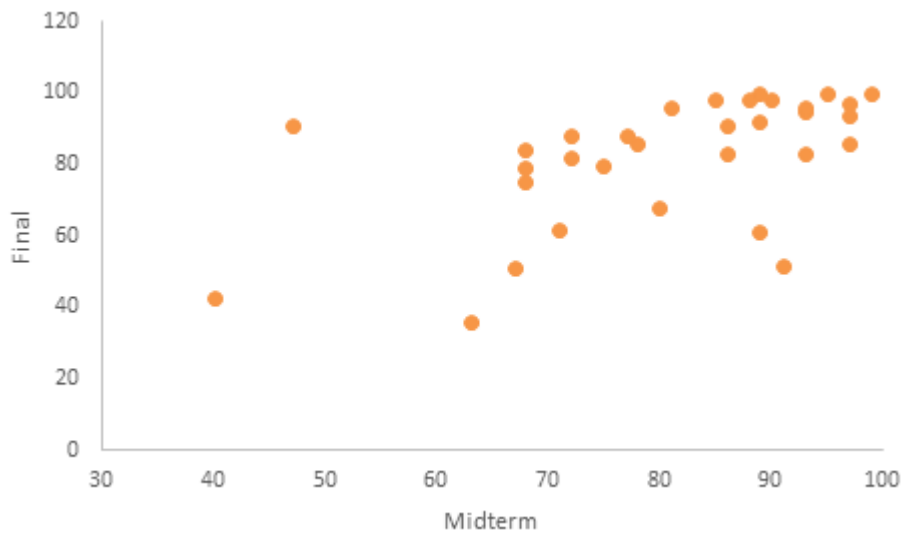
c.

Chapter 02 – Data Visualization



The majority of both business and nonbusiness students do not study hard, but nonbusiness students are more likely to study hard.

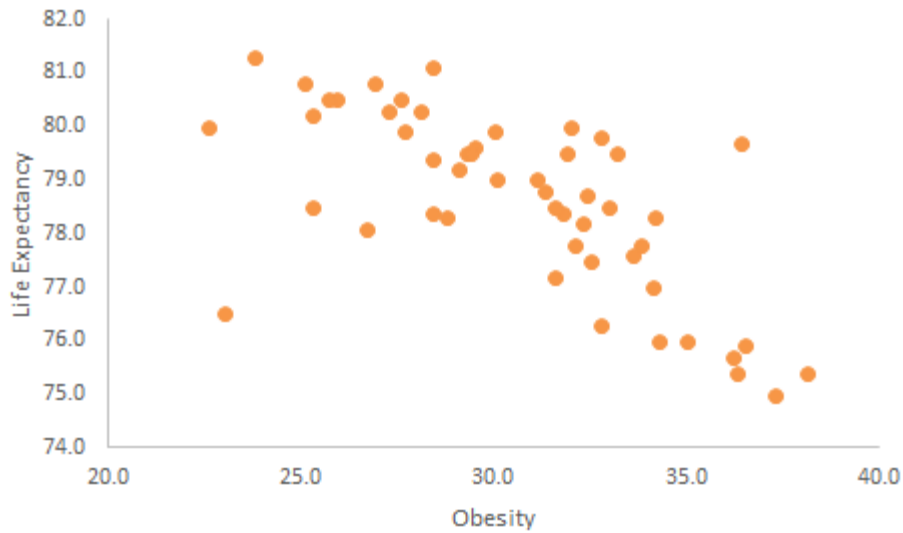
39.



There appears to be a positive relationship between a student's midterm score and a student's final score.

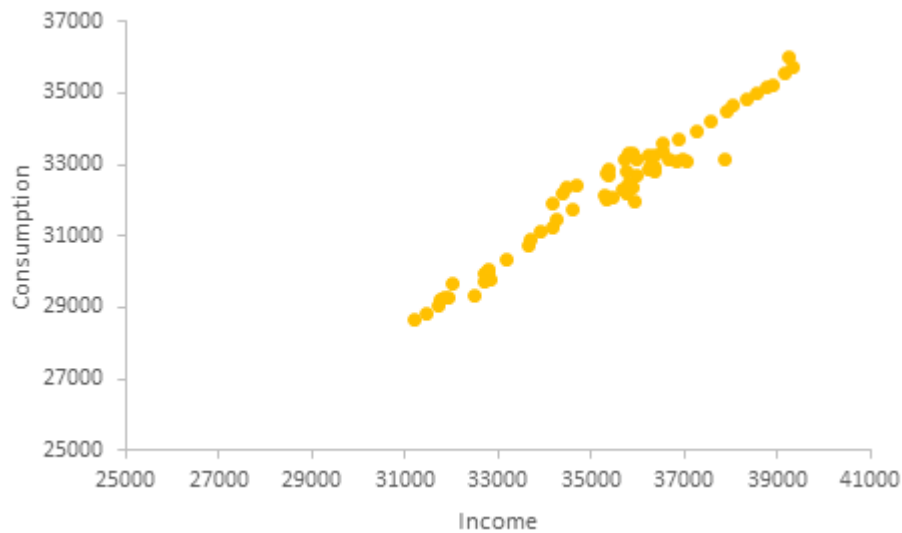
40.

Chapter 02 – Data Visualization



There appears to be a negative relationship between obesity and life expectancy.

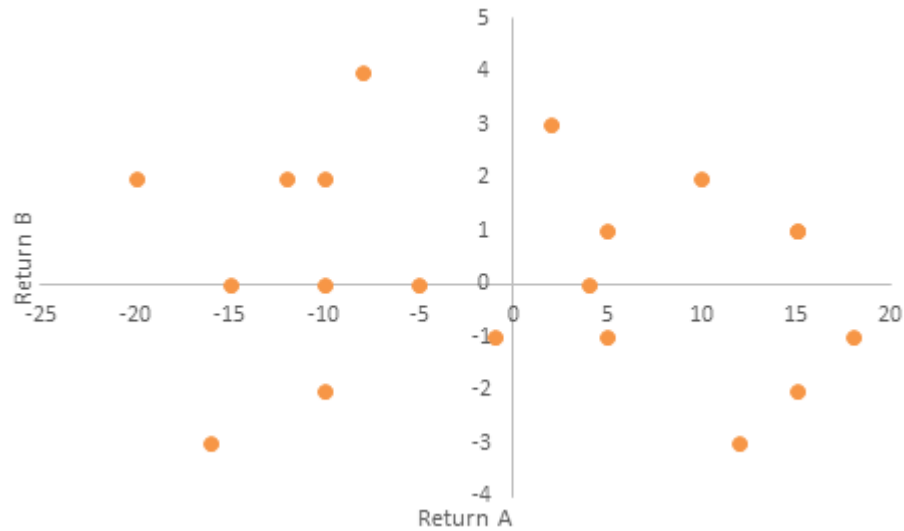
41.



There appears to be a positive relationship between disposable income and consumption.

Chapter 02 – Data Visualization

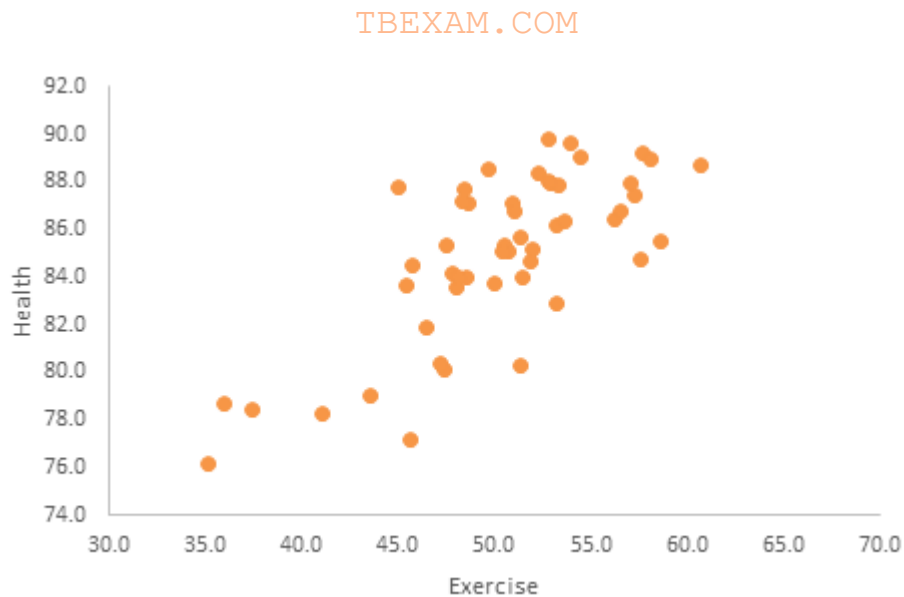
42.



There appears to be no relationship between the returns of A and B, so investing in both would diversify risk.

43.

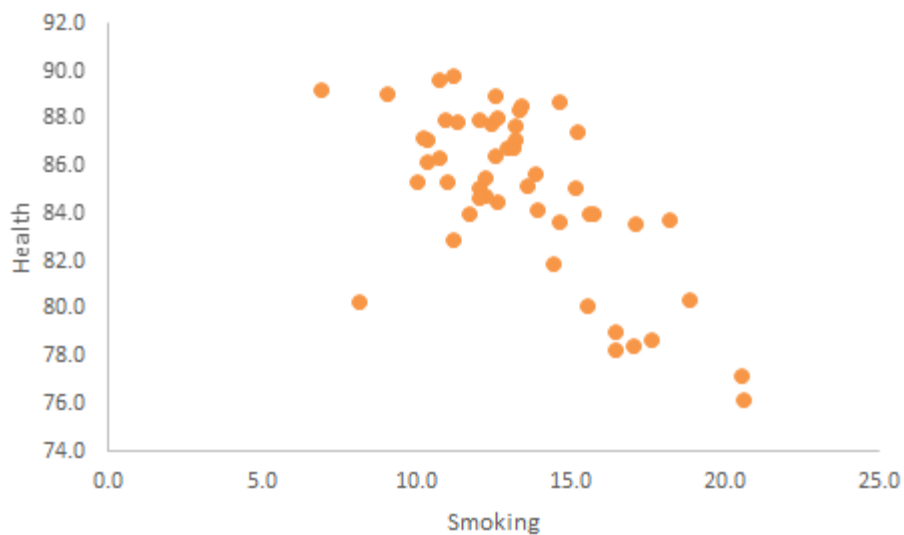
a.



There appears to be a positive relationship between health and exercise.

b.

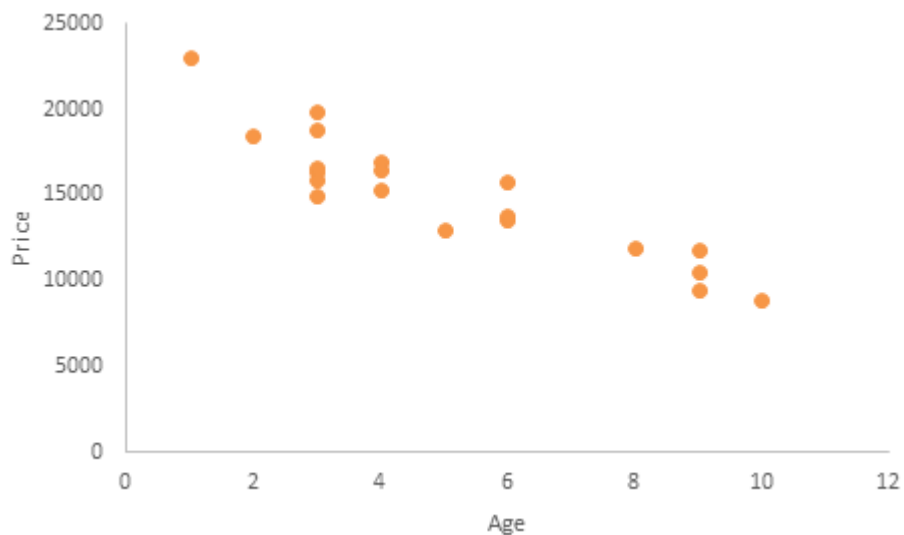
Chapter 02 – Data Visualization



There appears to be a negative relationship between health and smoking.

44.

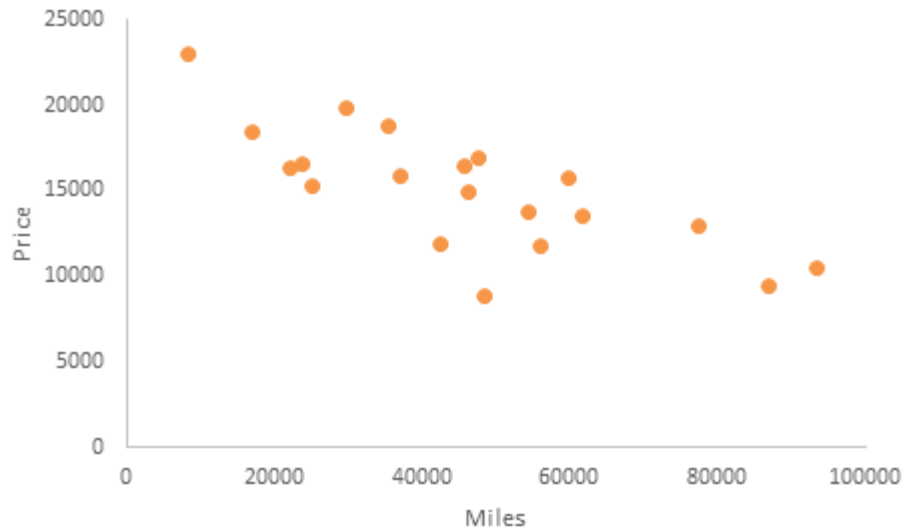
a.



There appears to be a negative relationship between the price of a car and its age.

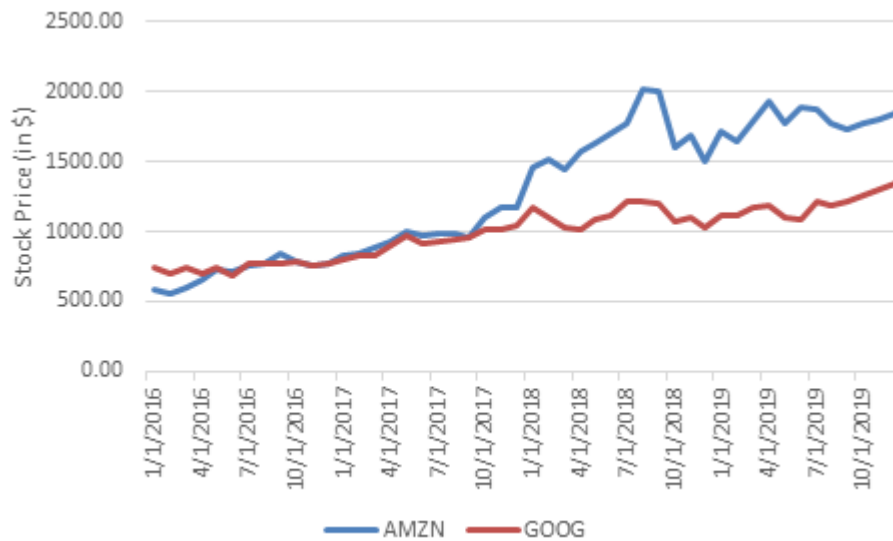
b.

Chapter 02 – Data Visualization



There appears to be a negative relationship between the price of a car and its mileage.

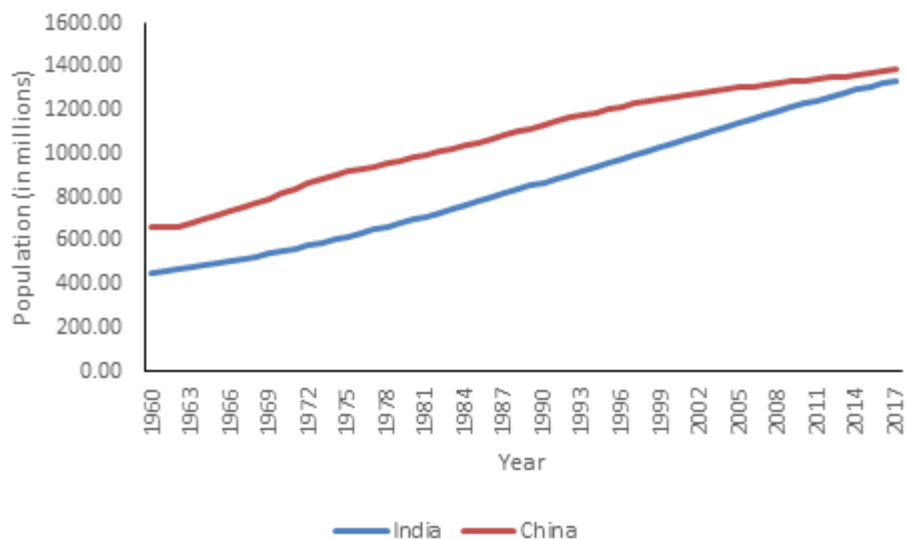
45.



GOOG has an upward trend. Amazon seems to have a greater trajectory, even though it had a steep drop in the latter half of 2018.

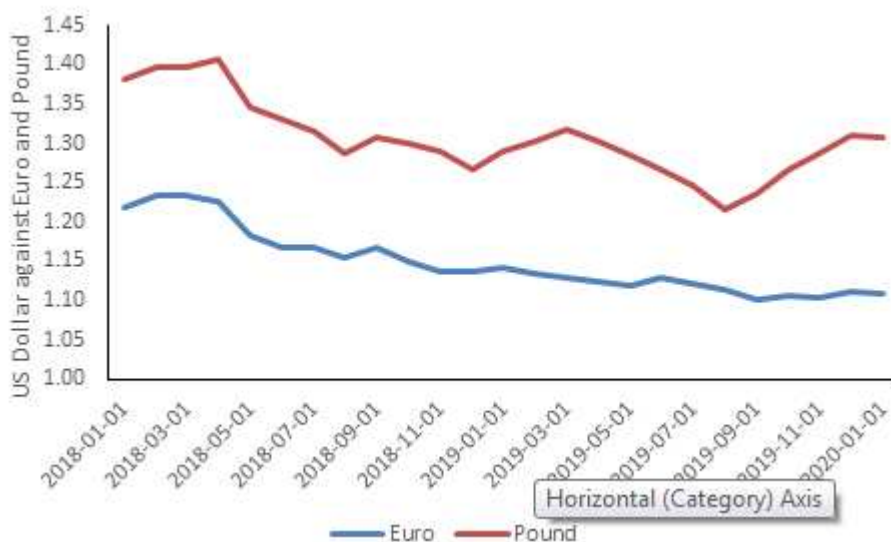
46.

Chapter 02 – Data Visualization



Both countries have a clear and consistent upward trend, but China's begins to stall slightly around 2000. India has slightly higher population growth over the past 40 years.

47.



Over this time period, we see a steady decline in the USD against the Euro which means that the USD has been appreciating over this period. In January 2018, the USD against the Euro was 1.22 meaning that one euro could buy 22 cents more in goods and services than one dollar could; however, in January 2020, the USD against Euro was 1.11, meaning that one euro could buy 11 cents more in goods and services than one dollar could.

Over this time period, we see a volatile decline in the USD against the Pound until around August 2019 (again implying appreciation of the USD). This low point corresponded to

Chapter 02 – Data Visualization

uncertainty surrounding Brexit. Since that time, the USD against the Pound has risen, almost reaching the same level as January 2018.

48. This graph does not correctly depict what has happened to company's stock price over this period. Because the vertical axis has been compressed by using an unreasonably high value as an upper limit (\$500), the rise in stock price appears dampened.
49. 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.

TBEXAM.COM