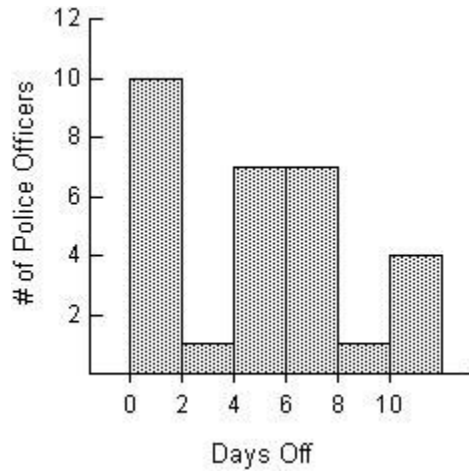*Statistics: Data and Models, Cdn. Ed., 3e* **(De Veaux)**
Chapter 3   Displaying and Summarizing Quantitative Data

3.1   Displays for Quantitative Variables

1) The number of days off that 30 police officers took in a given year are provided below. Create a histogram of the data using bins 2 days wide.

10	1	3	5	4	7
5	1	0	9	11	1
5	4	1	7	7	11
0	6	6	1	5	7
10	1	1	5	6	0

Answer:

Diff: 1   Type: SA
Objective: (3.1) *Create Graphical Display for Data

1

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2) Ontario wanted to find the typical size of farms in the province. The data below shows the sizes (in acres) of the 84 farms located in Ontario. Create a histogram of the data using bins that are 50 acres wide.

| 200	172	52	100	85	100
50	63	16	64	40	54
8	25	212	67	125	250
400	142	65	49	45	9
32	33	41	112	99	50
88	66	135	18	37	38
103	296	98	77	85	29
73	48	48	167	15	100
149	59	80	21	141	33
21	130	49	37	139	17
95	40	5	440	21	60
19	199	147	46	90	26
61	91	28	84	47	159
182	73	71	249	50	92

Answer:
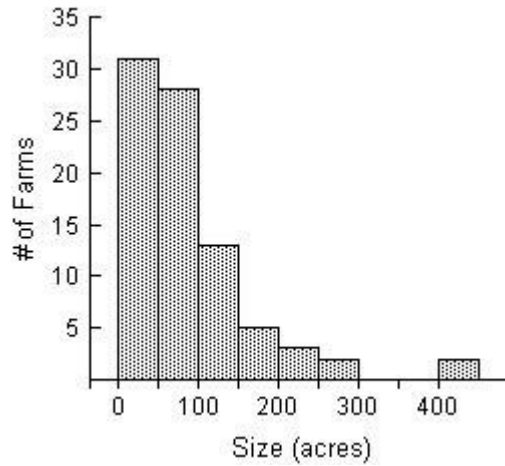
Diff: 1   Type: SA
Objective: (3.1) *Create Graphical Display for Data

3) In a college health course, 65 students participated in a physical fitness assessment. One measure used in the assessment was body fat. The body fat percentages for the 65 students is given below. Create a histogram of the data using bins that are 2% wide.

12	17	19	22	19
26	15	14	22	11
22	25	27	13	24
14	16	28	27	16
25	27	15	17	30
14	28	28	24	29
24	10	23	35	12
16	25	13	23	25
28	27	24	27	27
12	18	24	17	17
22	26	17	31	25
23	25	26	12	14
17	15	16	19	14

Answer:
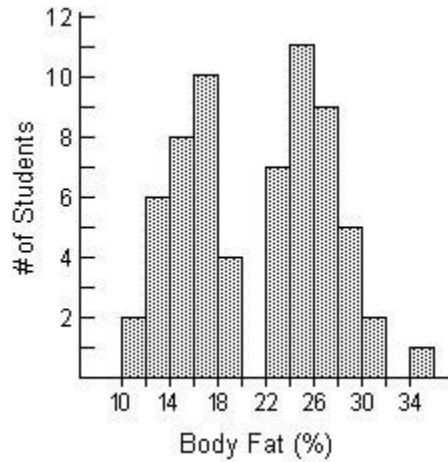
Diff: 1   Type: SA
Objective: (3.1) *Create Graphical Display for Data

4) The weights, in kilograms, of the members of the varsity football team are listed below. Create a stem-and-leaf display of the data. Use split stems by separating each stem into 5 stems.

72	76	71	75	80	76
65	82	70	76	70	75
72	67	78	74	66	86
80	68	80	74	85	82

Answer:

```
6 | 5
6 | 6 7
6 | 8
7 | 0 0 1
7 | 2 2
7 | 4 4 5 5
7 | 6 6 6
7 | 8
8 | 0 0 0
8 | 2 2
8 | 5
8 | 6
```

Key:
6 | 5 = 65 kg

Diff: 1   Type: SA
Objective: (3.1) *Create Graphical Display for Data

5) The diastolic blood pressures, in mm Hg, for a sample of patients at a clinic are given. Create a stem-and-leaf display of the data. Do not use split stems.

78	87	91	85	97
102	73	90	110	105
94	85	81	95	77
106	84	111	83	92
79	81	96	88	100
85	89	101	83	120
88	95	78	74	105
85	87	92	114	83

Answer:
```
 7 | 3 4 7 8 8 9
 8 | 1 1 3 3 3 4 5 5 5 5 7 7 8 8 9
 9 | 0 1 2 2 4 5 5 6 7
10 | 0 1 2 5 5 6
11 | 0 1 4
12 | 0
```

Key:
10 | 5 = 105 mm Hg

Diff: 1   Type: SA

Objective: (3.1) *Create Graphical Display for Data

6) The data below represent the midterm grades for 24 students enrolled in an electrical engineering course. Create a stem-and-leaf display of the data. Use split stems. Let the upper leaf represent digits 0-4 and the lower leaf represent 5-9.

85	77	93	91
74	65	68	97
88	59	74	83
85	72	63	79
51	86	70	71
90	75	78	69

Answer:

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

Key:
7 | 2 = 72%

Diff: 1   Type: SA
Objective: (3.1) *Create Graphical Display for Data

7) The diastolic blood pressures, in mm Hg, for a sample of patients at a clinic are given. Create a stem-and-leaf display of the data. Use split stems. Let the upper leaf represent digits 0-4 and the lower leaf represent 5-9.

78	87	91	85	97
102	73	90	110	105
94	85	81	95	77
106	84	111	83	92
79	81	96	88	100
85	89	101	83	120
88	95	78	74	105
85	87	92	114	83

Answer:

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

Key:
9 | 2 = 92 mm Hg
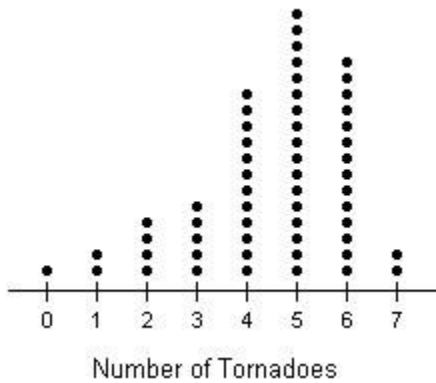
Diff: 1   Type: SA

Objective: (3.1) *Create Graphical Display for Data

8) The data below give the number of tornadoes that happened each year in a certain county from 1948 through 2004. Create a dotplot of these data.

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

Answer:

Tornadoes in Period 1948-2004

Number of Tornadoes

Diff: 1   Type: SA
Objective: (3.1) *Create Graphical Display for Data

9) In a survey, 20 people were asked how many magazines they had purchased during the previous year. The results are shown below. Construct a histogram to represent the data. Use 4 bins with a bin width of 10, and begin with a lower bin limit of -0.5. What is the approximate amount at the centre?

```
 6  15   3  36  25  18  12  18   5  30
24   7   0  22  33  24  19   4  12   9
```
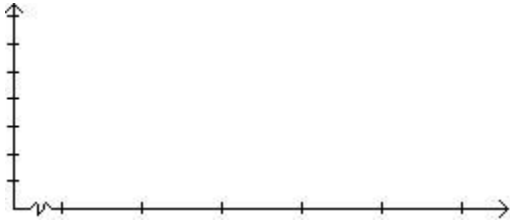

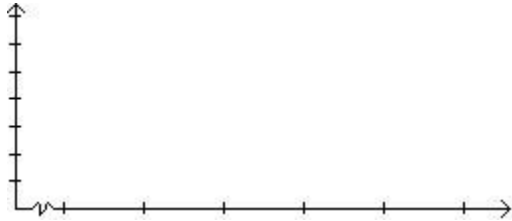Answer: The approximate amount at the centre is 16 magazines.
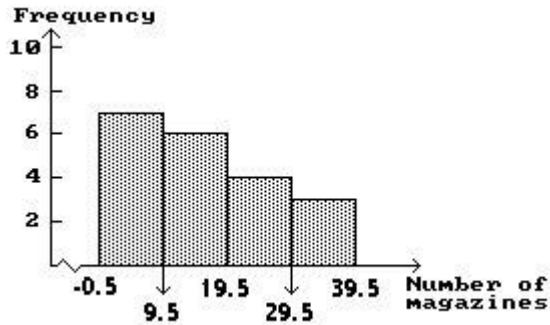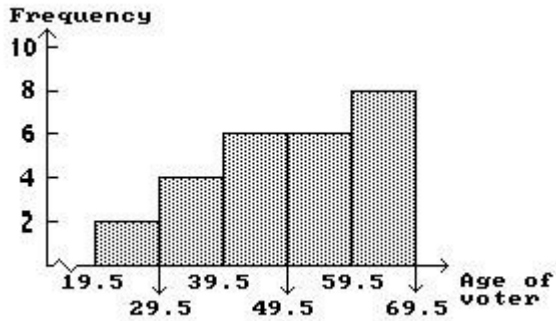

Diff: 1   Type: SA
Objective: (3.1) *Create Graphical Display for Data

10) In a survey, 26 voters were asked their ages. The results are shown below. Construct a histogram to represent the data (with 5 bins beginning with a lower bin limit of 19.5 and a bin width of 10). What is the approximate age at the centre?

```
43  56  28  63  67  66  52  48  37  51  40  60  62
66  45  21  35  49  32  53  61  53  69  31  48  59
```


Answer: The approximate age at the centre is 50.

Diff: 1   Type: SA
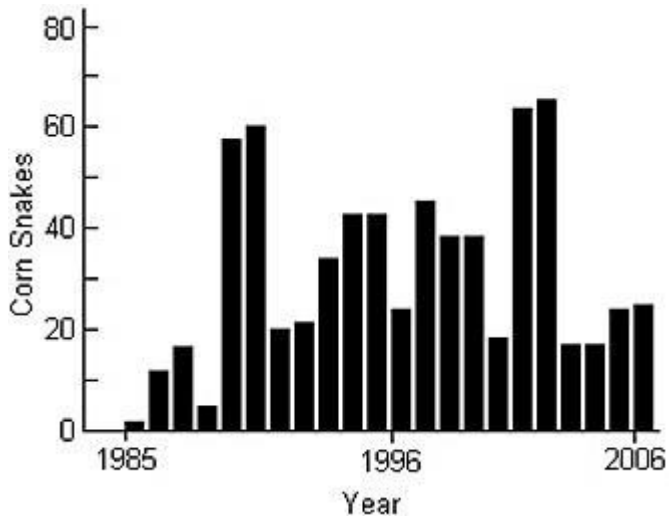Objective: (3.1) *Create Graphical Display for Data

11) Students were asked to make a histogram of the number of corn snakes collected in Will County, Illinois from 1985 to 2006. They were given the data in the form of a stem-and-leaf display shown below:

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

$5\,|\,7 = 57$ corn snakes

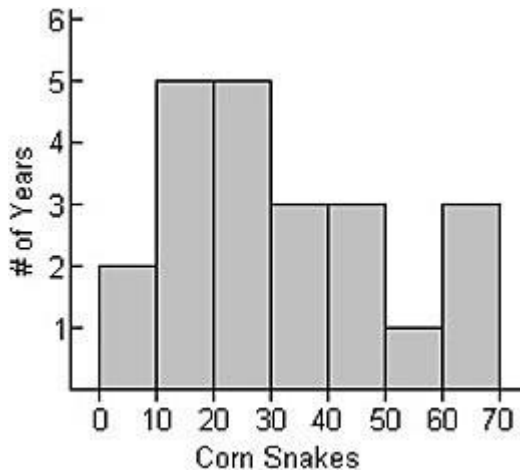One student submitted the following display:

a) Comment on this graph.
b) Create your own histogram of the data.

Answer:
a) This is not a histogram. The horizontal axis should split the number of corn snakes collected each year into bins. The vertical axis should show the number of years in each bin.
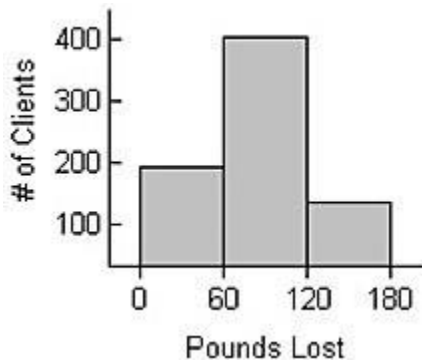b)

Diff: 2   Type: SA
Objective: (3.1) *Know Concepts: Displaying and Summarizing Quantitative Data

12) A weight-loss company used the following histogram to show the distribution of the number of pounds lost by clients during the year 2014. Comment on the display.

Answer: Histogram bin widths are too wide to be useful. However, we can tell that about 200 clients lost between 0 and 60 pounds, 400 clients lost between 60 and 120 pounds and about 150 clients lost between 120 and 180 pounds.
Diff: 2   Type: SA
Objective: (3.1) *Know Concepts: Displaying and Summarizing Quantitative Data

13) The following data consists of the heights, in centimetres, of 15 randomly selected female high school students and 15 randomly selected male high school students.

Women: 128   150   118   166   142
       122   137   110   175   152
       145   126   139   111   170

Men: 140   153   199   186   169
       136   176   162   196   155
       173   190   141   166   153

Choose the back-to-back stemplot that represents the given data.

I		
Men		Women
	11	0 1 8
	12	2 6 8
6	13	7 9
1 0	14	2 5
5 3 3	15	0 2
9 6 2	16	0 6
6 3	17	5
6 0	18	
9 6	19	

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

III		
Men		Women
	11	0 1 8
	12	2 6 8
6	13	7 9
1 0	14	2 5
5 3 3	15	0 2
9 6 2	16	6
6 3	17	0 5
6	18	
9 6 0	19	

IV		
Men		Women
	11	0 1 8
	12	2 6
6	13	7 8 9
1 0	14	2 5
5 3 3	15	0 2
9 6	16	6
6 3 2	17	0 5
6	18	
9 6 0	19	

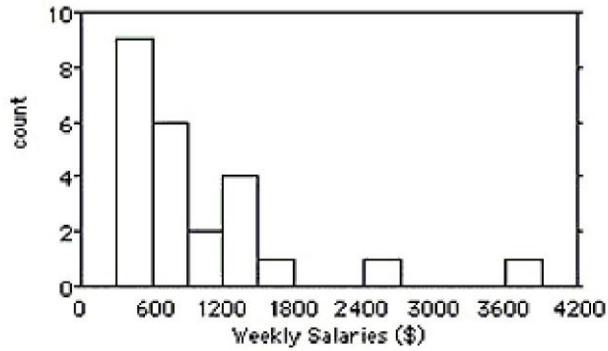| V		
Men		Women
	11	0 1 8
	12	2 6
6	13	7 8 9
1	14	2 5
5 3 3	15	0 2
9 6 0	16	6
6 3 2	17	0 5
6	18	
9 6 0	19	

A) I
B) II
C) III
D) IV
E) V
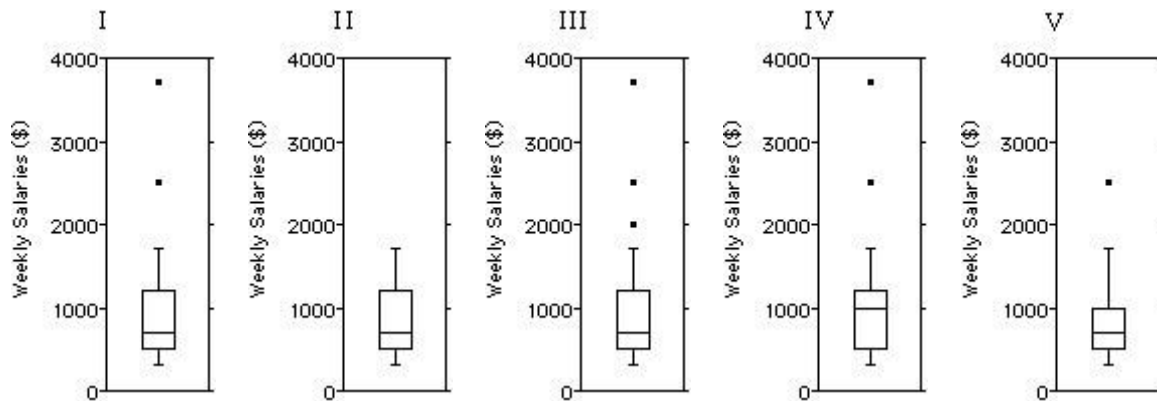Answer: C
Diff: 1   Type: BI
Objective: (3.1) Create Visual Display of Data

14) Shown below are the histogram and summary statistics for the weekly salaries (in dollars) of 24 randomly selected employees of a company:

Count	Mean	Median	StdDev	Min	Max	Q1	Q3
24	978.8	705	765.7	310	3700	510	1225

Choose the boxplot that represents the given data.

A) I
B) II
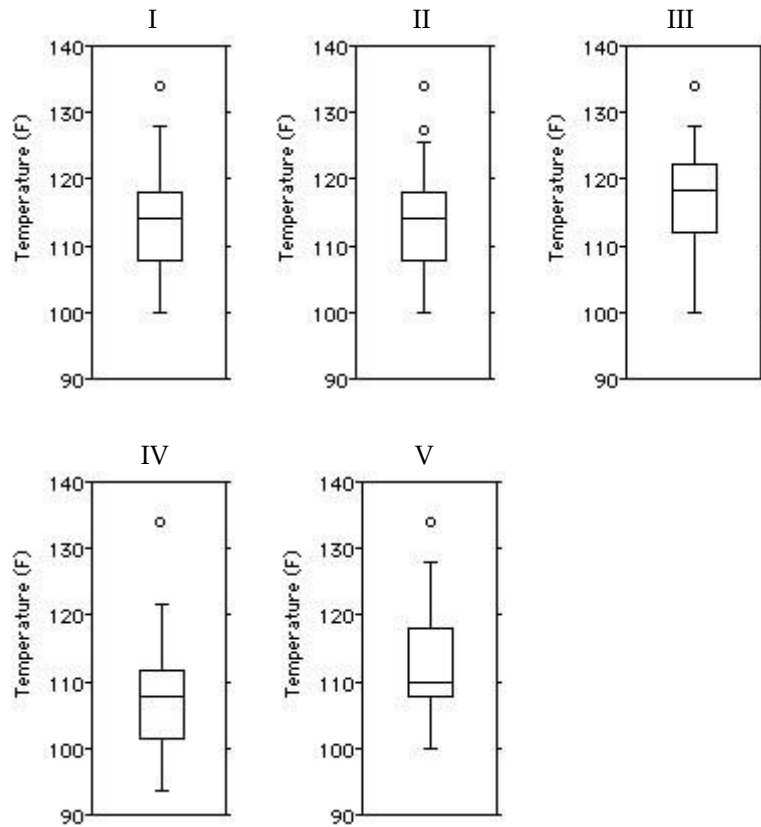C) III
D) IV
E) V
Answer: A
Diff: 1   Type: BI
Objective: (3.1) Create Visual Display of Data

15) Here are the highest temperatures ever recorded (in °F) in 32 different states in the U.S.A.

100 100 105   105   106   106   107   107
108 110 110   112   112   112   114   114
114 115 116   117   118   118   118   118
118 119 120   121   122   125   128   134

Choose the boxplot that represents the given data.

A) I
B) II
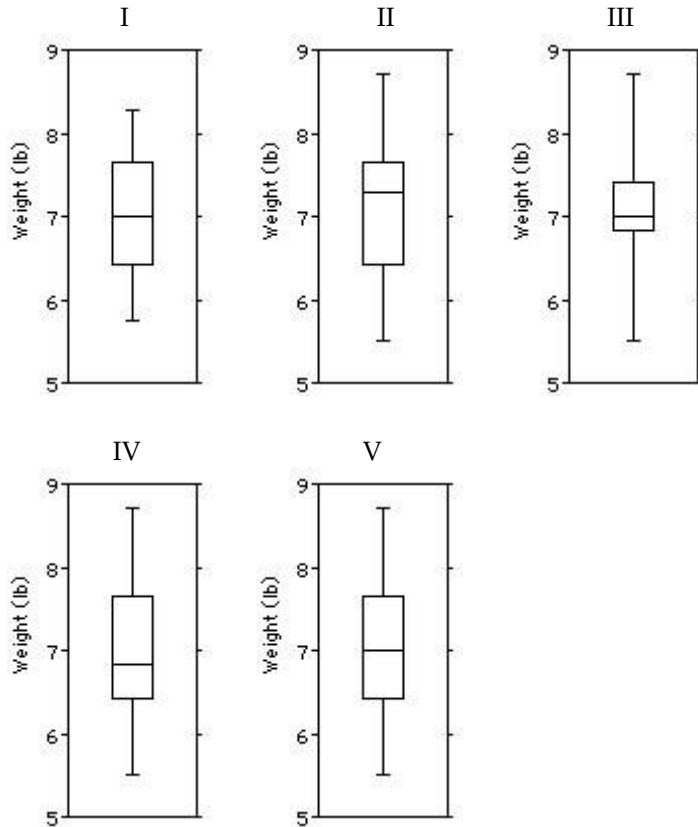C) III
D) IV
E) V
Answer: A
Diff: 1   Type: BI
Objective: (3.1) Create Visual Display of Data

16) The weights (in pounds) of 30 newborn babies are listed below.

5.5 5.7 5.8 5.9 6.1 6.1 6.3 6.4 6.5 6.6
6.7 6.7 6.7 6.9 7.0 7.0 7.0 7.1 7.2 7.2
7.4 7.5 7.7 7.7 7.8 8.0 8.1 8.1 8.3 8.7

Choose the boxplot that represents the given data.

A) I
B) II
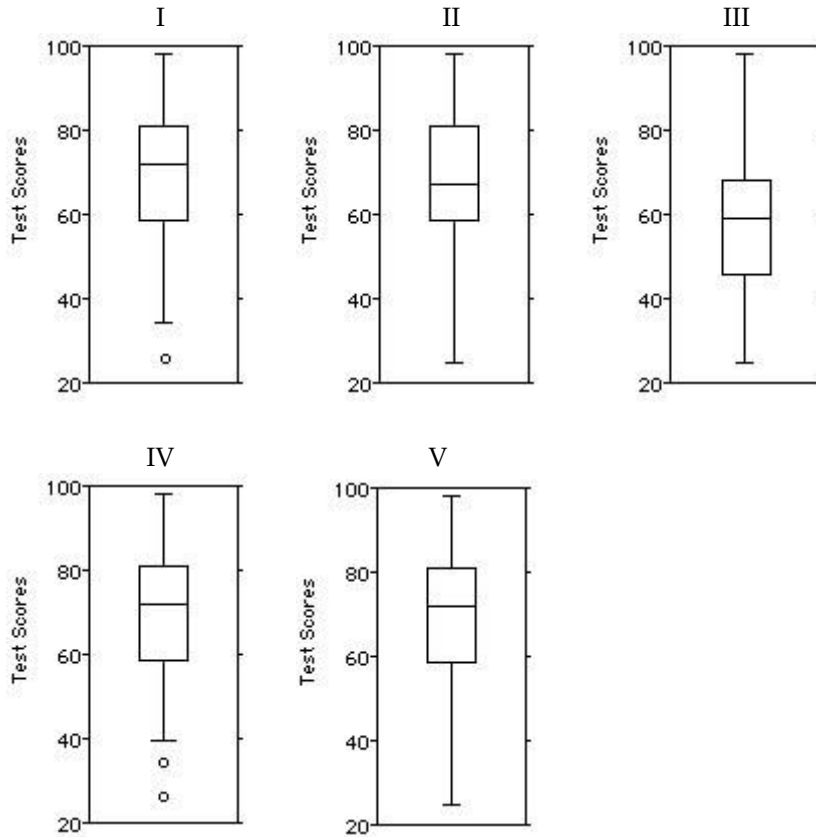C) III
D) IV
E) V
Answer: E
Diff: 1   Type: BI
Objective: (3.1) Create Visual Display of Data

17) The test scores of 40 students are listed below.

```
25  35  43  44  47  48  54  55  56  57
59  62  63  65  66  68  69  69  71  71
73  73  74  76  77  77  78  79  80  81
81  82  83  85  89  92  93  94  97  98
```

Choose the boxplot that represents the given data.

A) I
B) II
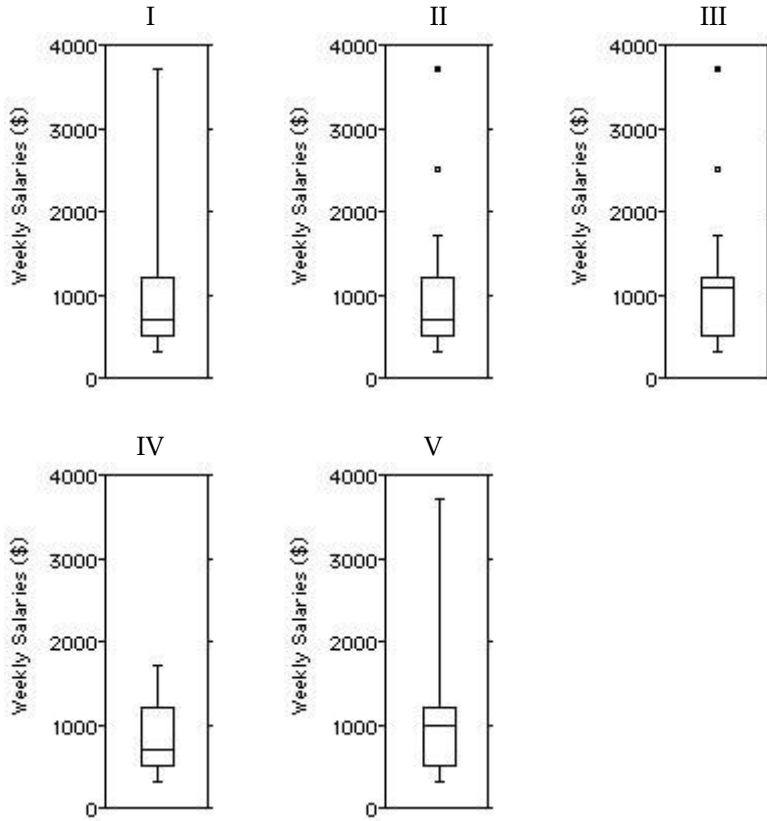C) III
D) IV
E) V
Answer: E
Diff: 1   Type: BI
Objective: (3.1) Create Visual Display of Data

18) The weekly salaries (in dollars) of 24 randomly selected employees of a company are shown below.

310	320	450	460	470	500	520	540
580	600	650	700	710	840	870	900
1000	1200	1250	1300	1400	1720	2500	3700

Choose the boxplot that represents the given data.

A) I
B) II
C) III
D) IV
E) V
Answer: B
Diff: 1   Type: BI
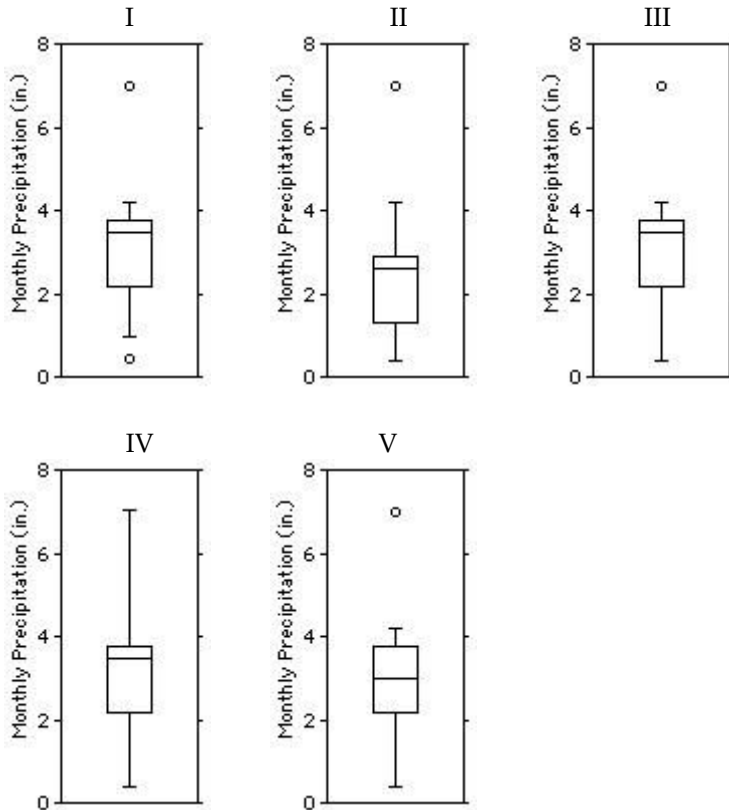Objective: (3.1) Create Visual Display of Data

19) The normal monthly precipitation (in inches) for August is listed for 20 different cities in Canada.

0.4 1.0 1.5 1.6 2.0
2.2 2.4 2.7 3.4 3.4
3.5 3.6 3.6 3.7 3.7
3.9 4.1 4.2 4.2 7.0

Choose the boxplot that represents the given data.

A) I
B) II
C) III
D) IV
E) V
Answer: C
Diff: 1   Type: BI
Objective: (3.1) Create Visual Display of Data

20) The ages of the 21 members of a track and field team are listed below.

```
15  18  18  19  22  23  24
24  24  24  25  26  26  27
28  28  30  32  33  40  42
```

Choose the boxplot that represents the given data.

A) I
B) II
C) III
D) IV
E) V
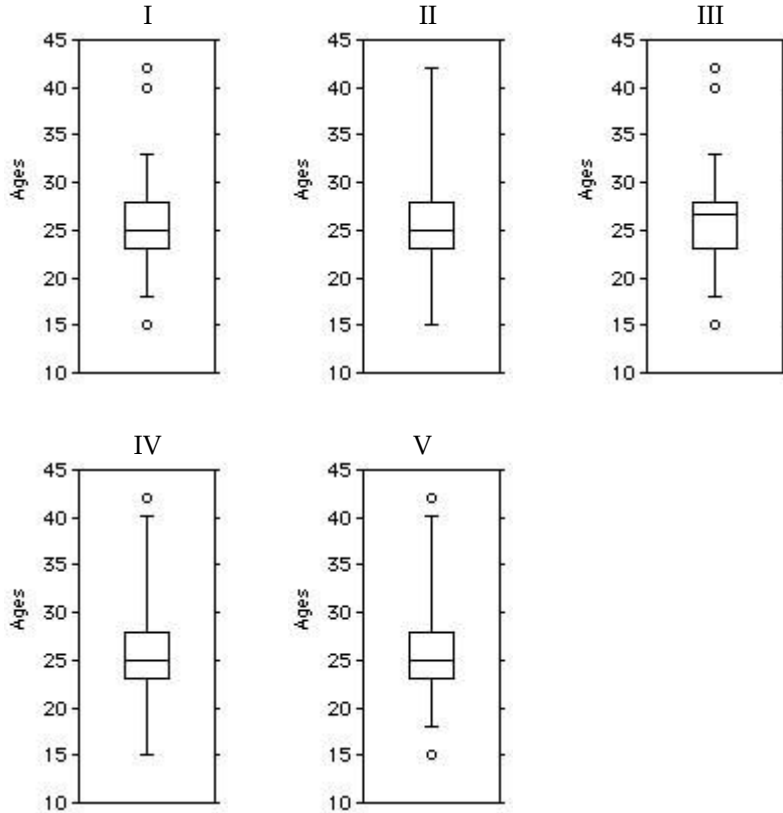
Answer: A

Diff: 1   Type: BI

Objective: (3.1) Create Visual Display of Data

21) Here is an ogive of the distribution of students' marks on their statistics test.

Choose the boxplot that represents the given data.
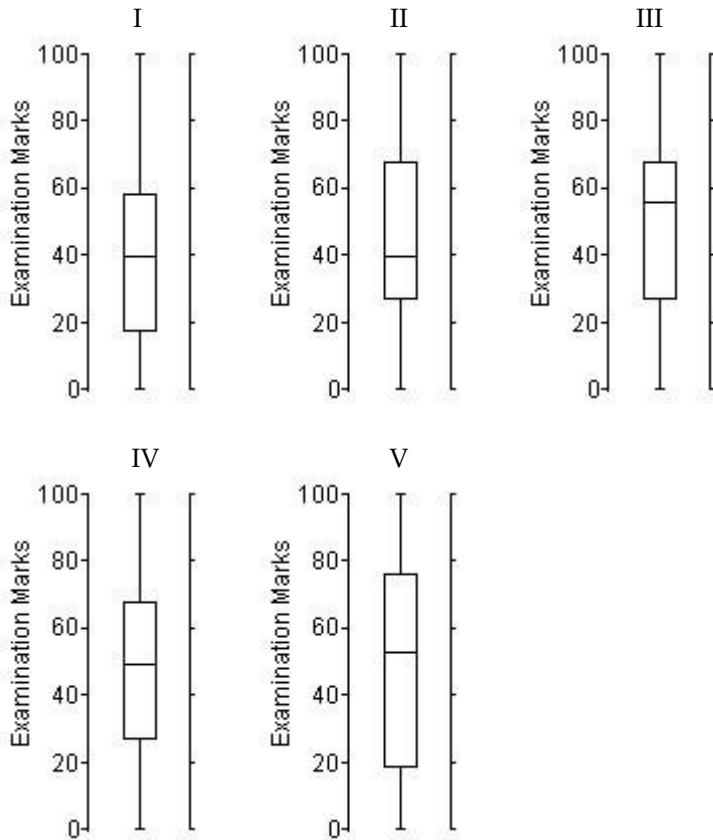
A) I
B) II
C) III
D) IV
E) V
Answer: D
Diff: 1   Type: BI
Objective: (3.1) Create Visual Display of Data

22) Here are the summary statistics for mathematics scores for one high-school graduating class.

	n	Mean	Median	SD	Min	Max	Q1	Q3
Male	17	60	63	18.6	30	100	52	78
Female	18	65	66	17.7	36	98	50	80

Choose the boxplot that represents the given data.
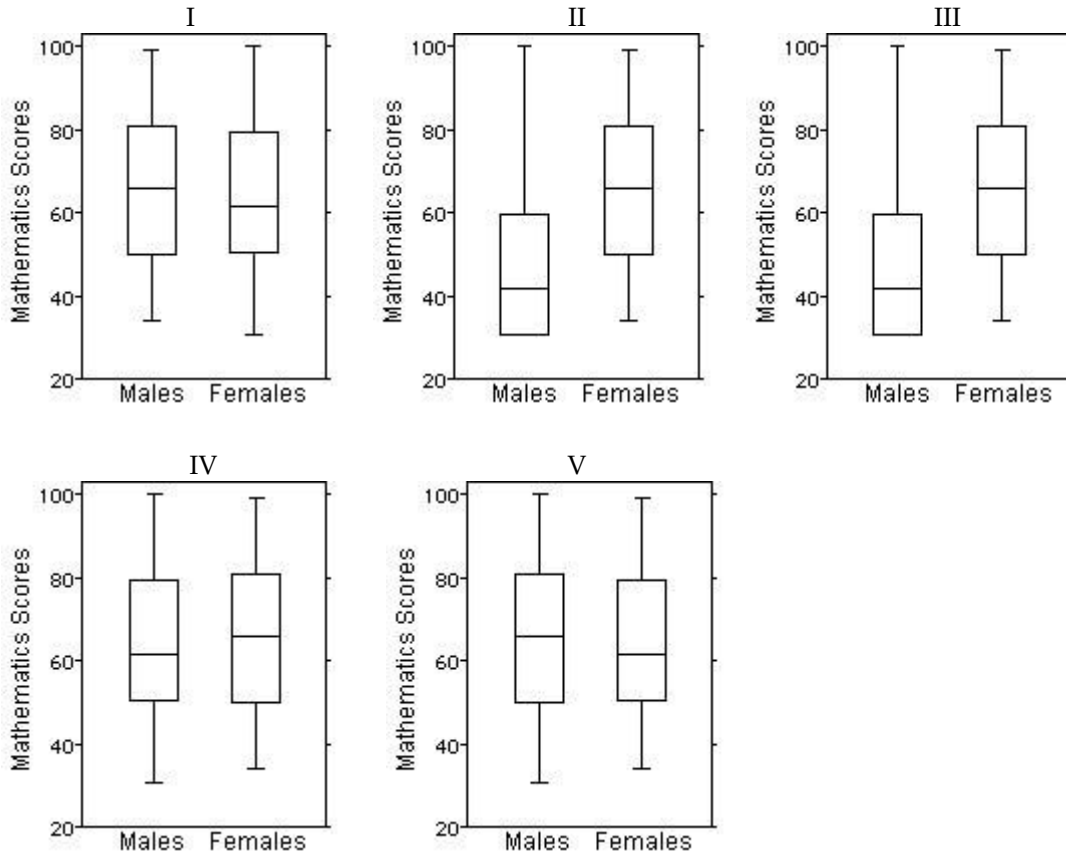
A) I
B) II
C) III
D) IV
E) V
Answer: D
Diff: 1   Type: BI
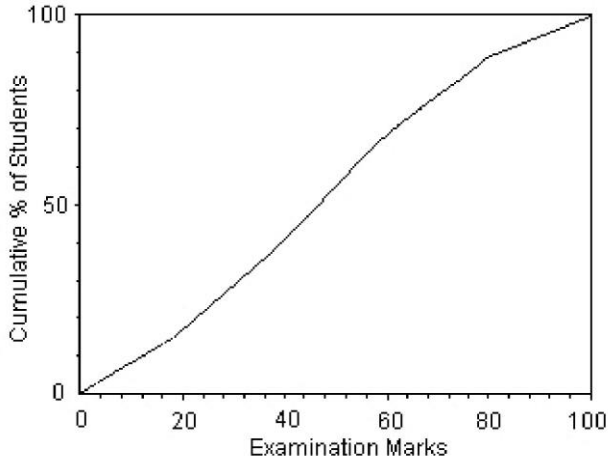Objective: (3.1) Create Visual Display of Data

3.2   Shape

Would you expect the distribution of this variable to be uniform, unimodal, or bimodal? Symmetric or skewed? Explain why.

1) Heights of a group of male professional athletes, half of whom are gymnasts and half of whom are basketball players.
A) The distribution would likely be unimodal and slightly skewed right. The average height of the gymnasts and basketball players would be about the same. The distribution would be slightly skewed to the right, since it is possible to have some exceptionally tall basketball players.
B) The distribution would likely be uniform, with heights of the professional athletes evenly distributed.
C) The distribution would likely be bimodal and slightly skewed right. The average height of the gymnasts would be at one mode, and the average height of the basketball players would be at the other mode, since basketball players are taller than gymnasts. The distribution would be slightly skewed to the right, since it is possible to have some exceptionally tall basketball players, and it is less likely that the heights of gymnasts would vary significantly.
D) The distribution would likely be bimodal and slightly skewed left. The average height of the gymnasts would be at one mode, and the average height of the basketball players would be at the other mode, since basketball players are taller than gymnasts. The distribution would be slightly skewed to the left, since it is possible to have some exceptionally tall basketball players, and it is less likely that the heights of gymnasts would vary significantly.
E) The distribution would likely be unimodal and symmetric. The average height of the gymnasts and basketball players would be about the same. The distribution would be symmetric, since it is possible to have some exceptionally tall basketball players, and exceptionally short gymnasts.
Answer: C
Diff: 1   Type: BI
Objective: (3.2) Describe Distribution Given Situation

2) Ages of high school students.
A) The distribution would likely be unimodal and slightly skewed to the left. The average age of the high school students would be about the same. The distribution would be slightly skewed to the left, since there are more freshmen.
B) The distribution would likely be unimodal and slightly skewed to the right. The average age of the high school students would be about the same. The distribution would be slightly skewed to the right, since there are more seniors.
C) The distribution would likely be bimodal and slightly skewed to the right. The average age of the freshman and sophomores would be at one mode, and the average age of the juniors and seniors would be at the other mode. The distribution would be slightly skewed to the right, since there are more seniors.
D) The distribution would likely be uniform. Freshmen tend to be about 14 years old; sophomores, 15; juniors, 16; and seniors, 17. Since there is about an equal number of students in each class, the distribution is uniform.
E) The distribution would likely be unimodal and symmetric. The average age of the high school students would be about the same, with some students that are older and some that are younger than the average age.
Answer: D
Diff: 1   Type: BI
Objective: (3.2) Describe Distribution Given Situation

3) Number of times each face of a fair six-sided die shows in 60 tosses.
A) The distribution would likely be unimodal and skewed left. The average of the numbers on the face of the die would be around 3.5, with more tosses less than 3.5.
B) The distribution would likely be uniform, with around 10 occurrences of each side.
C) The distribution would likely be unimodal and symmetric. The average of the numbers on the face of the die would be around 3.5, with a some tosses greater than 3.5 and some less than 3.5.
D) The distribution would likely be unimodal and skewed right. The average of the numbers on the face of the die would be around 3.5, with more tosses greater than 3.5.
E) The distribution would likely be uniform, with around 60 occurrences of each side.
Answer: B
Diff: 1   Type: BI
Objective: (3.2) Describe Distribution Given Situation

4) Heights of adult women attending a concert.
A) The distribution would likely be unimodal and symmetric. The average height of women at the concert will be about the same as the median height. The distribution will likely be symmetric, since there are some women who are taller than average and some that are shorter.
B) The distribution would likely be uniform, with the heights of women evenly distributed.
C) The distribution would likely be unimodal and slightly skewed right. The average height of women at the concert will be about the same as the median height. The distribution will likely be slightly skewed right, since there are more women who are tall than short.
D) The distribution would likely be bimodal and slightly skewed left. The average height of shorter women will be at one mode, and the average height of taller women at the other mode. The distribution will likely be slightly skewed left, since there are more women who are short than tall.
E) The distribution would likely be bimodal and slightly skewed right. The average height of shorter women will be at one mode, and the average height of taller women at the other mode. The distribution will likely be slightly skewed right, since there are more women who are tall than short.
Answer: A
Diff: 1   Type: BI
Objective: (3.2) Describe Distribution Given Situation

5) Ages of patients who had their tonsils removed at a hospital over the course of a year.
A) The distribution would likely be bimodal and skewed right. The procedure is much more common among young people, so most patients would be younger, perhaps 8-12 years old. Eight-year-olds would be at one mode, and twelve-year-olds would be at the other mode. The distribution would be skewed right, since it is possible to have a greater variety of ages among older people, while there is a natural left endpoint to the distribution at zero years of age.
B) The distribution would likely be unimodal and symmetric. The procedure is much more common among young people, so most patients would be younger, perhaps 8-12 years old. The distribution would be symmetric, since it is possible to have this procedure done earlier or later than the average age.
C) The distribution would likely be unimodal and skewed left. The procedure is much more common among young people, so most patients would be younger, perhaps 8-12 years old. The distribution would be skewed left, since it is possible to have a greater variety of ages among younger people
D) The distribution would likely be unimodal and skewed right. The procedure is much more common among young people, so most patients would be younger, perhaps 8-12 years old. The distribution would be skewed right, since it is possible to have a greater variety of ages among older people, while there is a natural left endpoint to the distribution at zero years of age.
E) The distribution would likely be bimodal and symmetric. The procedure is much more common among young people, so most patients would be younger, perhaps 8-12 years old. Eight-year-olds would be at one mode, and twelve-year-olds would be at the other mode. The distribution would be symmetric, since it is possible to have this procedure done earlier or later than the average age.
Answer: D
Diff: 1   Type: BI
Objective: (3.2) Describe Distribution Given Situation

6) Number of innings in the baseball games a major league team plays over the course of a season.
A) The distribution would likely be bimodal and skewed right. The great majority of the games will be nine innings and this would represent one mode. However, if the score of a game is tied after nine innings, extra innings are played, so some games will last 10, 11, 12, or more innings; and, this will represent the other mode. Some games will be 5-8 innings, if for example rain cuts them short, and this is more common than extra-inning games, so the distribution would be skewed to the left.
B) The distribution would likely be bimodal and skewed right. The great majority of the games will be nine innings and this would represent one mode. However, if the score of a game is tied after nine innings, extra innings are played, so some games will last 10, 11, 12, or more innings; and, this will represent the other mode. Some games will be 5-8 innings, if for example rain cuts them short, but extra-inning games are much more common, so the distribution would be skewed to the right.
C) The distribution would likely be unimodal and skewed right. The great majority of the games will be nine innings. However, if the score of a game is tied after nine innings, extra innings are played, so some games will last 10, 11, 12, or more innings. Some games will be 5-8 innings, if for example rain cuts them short, but extra-inning games are much more common, so the distribution would be skewed to the right.
D) The distribution would likely be unimodal and skewed left. The great majority of the games will be nine innings. However, if the score of a game is tied after nine innings, extra innings are played, so some games will last 10, 11, 12, or more innings. Some games will be 5-8 innings, if for example rain cuts them short, and this is more common than extra-inning games, so the distribution would be skewed to the left.
E) The distribution would likely be uniform. Some games will be nine innings. However, if the score of a game is tied after nine innings, extra innings are played, so some games will last 10, 11, 12, or more innings. Some games will be 5-8 innings, if for example rain cuts them short. The number of innings in the games would be evenly distributed.
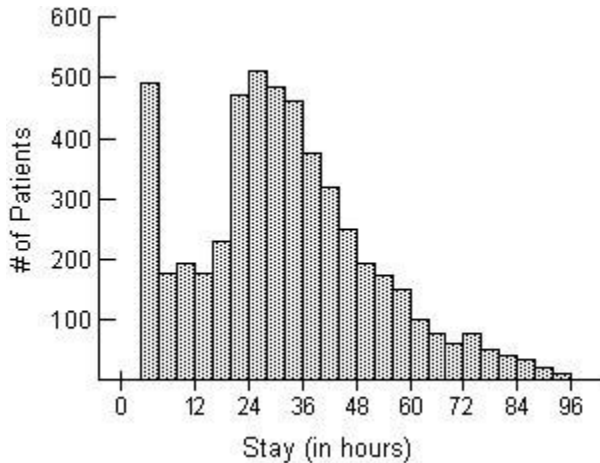Answer: C
Diff: 1   Type: BI
Objective: (3.2) Describe Distribution Given Situation

Describe the distribution (shape, centre, spread, unusual features).

7) The histogram shows the lengths of hospital stays (in hours) for pregnant women admitted to hospitals in Ontario who were having contractions upon arrival.

A) The distribution of the length of hospital stays for pregnant patients is skewed to the right, with stays ranging from 1 hour to 96 hours. The distribution is centred around 26 hours, with the majority of stays lasting between 1 to 48 hours. There are relatively few hospital stays longer than 72 hours. Many patients have a stay of only 1-4 hours, possibly because it was not time to deliver.

B) The distribution of the length of hospital stays for pregnant patients is skewed to the right, with stays ranging from 1 hour to 95 hours. The distribution is centred around 26 hours, with the majority of stays lasting between 1 to 48 hours. There are relatively few hospital stays longer than 72 hours.

C) The distribution of the length of hospital stays for pregnant patients is skewed to the right, with stays ranging from 1 hour to 96 hours. The distribution is centred around 26 hours, with the majority of stays lasting between 3 to 24 hours. There are relatively few hospital stays longer than 72 hours. Many patients have a stay of only 1-4 hours, possibly because it was not time to deliver.

D) The distribution of the length of hospital stays for pregnant patients is skewed to the right, with stays ranging from 1 hour to 95 hours. The distribution is centred around 48 hours, with the majority of stays lasting between 24 to 72 hours. There are relatively few hospital stays longer than 72 hours. Many patients have a stay of only 1-3 hours, possibly because it was not time to deliver.

E) The distribution of the length of hospital stays for pregnant patients is skewed to the right, with stays ranging from 1 hour to 95 hours. The distribution is centred around 26 hours, with the majority of stays lasting between 1 to 48 hours. There are relatively few hospital stays longer than 72 hours. Many patients have a stay of only 1-3 hours, possibly because it was not time to deliver.

Answer: E

Diff: 1   Type: BI

Objective: (3.2) Describe Distribution Given Histogram

8) A university instructor created a website for her Chemistry course. The students in her class were encouraged to use the website as an additional resource for the course. At the end of the semester, the instructor asked each student how many times he or she visited the website and recorded the counts. Based on the histogram below, describe the distribution of website use.
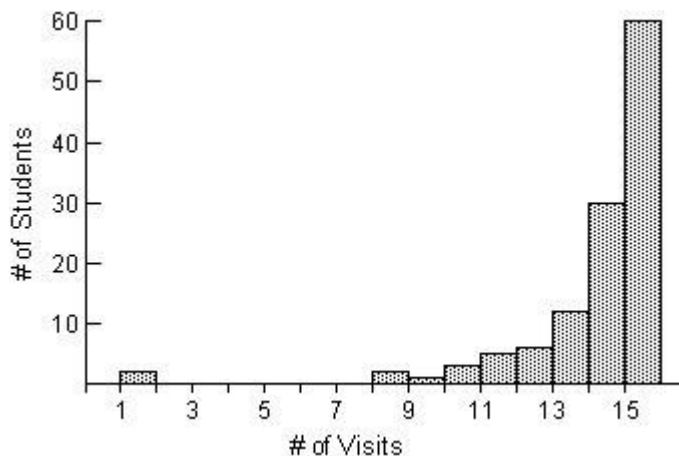
A) The distribution of the number of visits to the course website by each student for the semester is skewed to the left, with the number of visits ranging from 1 to 15 visits. The distribution is centred at about 14 visits, with many students visiting 15 times.

B) The distribution of the number of visits to the course website by each student for the semester is skewed to the left, with the number of visits ranging from 1 to 16 visits. The distribution is centred at about 14 visits, with many students visiting 15 times. There is an outlier in the distribution, two students who visited the site only once. The next highest number of visits was 8.

C) The distribution of the number of visits to the course website by each student for the semester is skewed to the right, with the number of visits ranging from 1 to 15 visits. The distribution is centred at about 14 visits, with many students visiting 15 times. There is an outlier in the distribution, two students who visited the site only once. The next highest number of visits was 8.

D) The distribution of the number of visits to the course website by each student for the semester is skewed to the left, with the number of visits ranging from 1 to 15 visits. The distribution is centred at about 14 visits, with many students visiting 15 times. There is an outlier in the distribution, two students who visited the site only once. The next highest number of visits was 8.

E) The distribution of the number of visits to the course website by each student for the semester is skewed to the left, with the number of visits ranging from 1 to 15 visits. The distribution is centred at about 12 visits, with many students visiting 15 times. There is an outlier in the distribution, two students who visited the site only once. The next highest number of visits was 8.
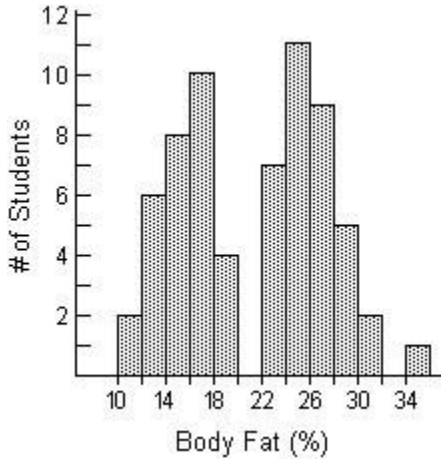
Answer: D

Diff: 1   Type: BI

Objective: (3.2) Describe Distribution Given Histogram

9) The histogram displays the body fat percentages of 65 students taking a college health course. In addition to describing the distribution, give a reason to account for the shape of this distribution.

A) The distribution of body fat percentages is bimodal, with a cluster of body fat percentages around 16% and another cluster of body fat percentages around 26%. The upper cluster shows a bit of a skew to the right. Most students in the lower cluster have body fat percentages between 16% and 20%, and most students in the upper cluster have body fat percentages between 22% and 26%. Men and women have different body fat percentages: the lower cluster would likely represent male students, and the upper cluster would likely represent female students.

B) The distribution of body fat percentages is unimodal, with a bit of a skew to the right. The body fat percentages are centred around 20%, with a range of 10% to 35%. Most students have body fat percentages between 12% and 28%. Men and women have different body fat percentages, but the average of body fat percentages for men and women would be around 20%.

C) The distribution of body fat percentages is unimodal, with a bit of a skew to the right. The body fat percentages are centred around 24%, with a range of 10% to 34%. Most students have body fat percentages between 12% and 28%. Men and women have different body fat percentages, but the average of body fat percentages for men and women would be around 24%.

D) The distribution of body fat percentages is bimodal, with a cluster of body fat percentages around 16% and another cluster of body fat percentages around 26%. The upper cluster shows a bit of a skew to the right. Most students in the lower cluster have body fat percentages between 12% and 18%, and most students in the upper cluster have body fat percentages between 22% and 28%. Men and women have different body fat percentages: the lower cluster would likely represent male students, and the upper cluster would likely represent female students.

E) The distribution of body fat percentages is bimodal, with a cluster of body fat percentages around 12% and another cluster of body fat percentages around 28%. The upper cluster shows a bit of a skew to the right. Most students in the lower cluster have body fat percentages between 12% and 18%, and most students in the upper cluster have body fat percentages between 22% and 28%. Men and women have different body fat percentages: the lower cluster would likely represent male students, and the upper cluster would likely represent female students.

Answer: D

Diff: 1   Type: BI

Objective: (3.2) Describe Distribution Given Histogram

10) The display shows the heights of Grade 12 students at a local high school, collected so that the students could be arranged with shorter ones in front and taller ones in back for a class photograph. In addition to describing the distribution, give a reason to account for the shape of this distribution.
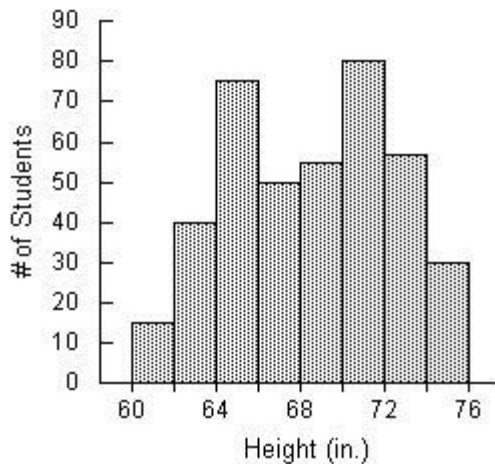
A) The distribution of the heights of Grade 12 students is bimodal, with a mode at around 65 inches and the other mode around 71 inches. The students' heights are between 60 inches and 74 inches. The two modes would likely represent the average heights of the male and female students.

B) The distribution of the heights of Grade 12 students is unimodal centred at 68, with a heights ranging from 60 inches to 76 inches. The two peaks would likely represent the average heights of the male and female students.

C) The distribution of the heights of Grade 12 students is bimodal, with a mode at around 62 inches and the other mode around 74 inches. No student has a height below 60 inches or above 76 inches. The two modes would likely represent the average heights of the male and female students.

D) The distribution of the heights of Grade 12 students is bimodal, with a mode at around 65 inches and the other mode around 71 inches. No student has a height below 60 inches or above 76 inches. The two modes would likely represent the average heights of the male and female students.

E) The distribution of the heights of Grade 12 students is uniform centred at 68, with a heights ranging from 60 inches to 76 inches. The two peaks would likely represent the average heights of the male and female students.

Answer: D

Diff: 1   Type: BI

Objective: (3.2) Describe Distribution Given Histogram

11) The histogram shows the sizes (in acres) of 169 farms in Ontario. In addition to describing the distribution, approximate the percentage of farms that are under 100 acres.
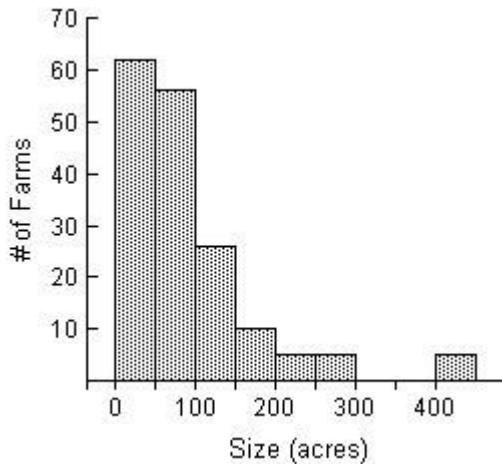
A) The distribution of the size of farms in Ontario is skewed to the right. Most of the farms are smaller than 150 acres, with some larger ones, from 150 to 300 acres. Five farms were larger than the rest, over 400 acres. The mode of the distribution is between 0 and 50 acres. It appears that 118 of 169 farms are under 100 acres, approximately 70%.
B) The distribution of the size of farms in Ontario is symmetric, with farm sizes ranging from 0 to 450 acres. The mode of the distribution is between 0 and 50 acres. It appears that 118 of 169 farms are under 100 acres, approximately 70%.
C) The distribution of the size of farms in Ontario is symmetric, with farm sizes ranging from 0 to 450 acres. The mode of the distribution is between 100 and 150 acres. It appears that 118 of 169 farms are under 100 acres, approximately 70%.
D) The distribution of the size of farms in Ontario is skewed to the right. Most of the farms are smaller than 50 acres, with some larger ones, from 150 to 300 acres. Five farms were larger than the rest, over 400 acres. The mode of the distribution is between 0 and 50 acres. It appears that 118 of 169 farms are under 100 acres, approximately 70%.
E) The distribution of the size of farms in Ontario is skewed to the right. Most of the farms are smaller than 150 acres, with some larger ones, from 150 to 300 acres. Five farms were larger than the rest, over 400 acres. The mode of the distribution is between 0 and 50 acres. It appears that 62 of 169 farms are under 100 acres, approximately 37%.
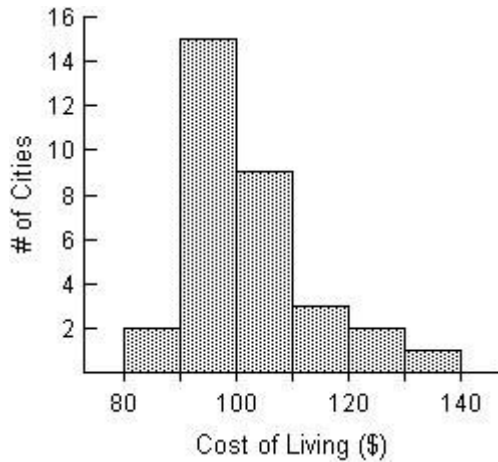Answer: A
Diff: 1   Type: BI
Objective: (3.2) Describe Distribution Given Histogram

12) The histogram shows the cost of living, in dollars, in 32 Canadian towns.

A) The distribution of the cost of living in the 32 Canadian cities is unimodal and skewed to the right. The distribution is centred around $100, and spread out, with values ranging from $80 to $139.99.
B) The distribution of the cost of living in the 32 Canadian cities is unimodal and skewed to the right. The distribution is centred around $110, and spread out, with values ranging from $80 to $140.
C) The distribution of the cost of living in the 32 Canadian cities is unimodal and skewed to the right. The distribution is centred around $90, and spread out, with values ranging from $80 to $139.99.
D) The distribution of the cost of living in the 32 Canadian cities is unimodal and skewed to the left. The distribution is centred around $100, and spread out, with values ranging from $80 to $139.99.
E) The distribution of the cost of living in the 32 Canadian cities is unimodal. The distribution is centred around $100, and spread out, with values ranging from $80 to $140.
Answer: A
Diff: 1   Type: BI
Objective: (3.2) Describe Distribution Given Histogram

13) In May 2014, 17 coffee shops in Toronto charged the following amounts, in dollars, for a large cup of coffee (including tax). The lower stem contains leaves with the digits 0-4 and the upper stem contains leaves with digits 5-9.

Large Coffee Prices
```
2.1 | 7 8
2.1 |
2.0 | 6 8
2.0 | 0 2 3 3
1.9 | 5 6 7 7 7 8
1.9 | 3 4 4
```

Key:
1.9 | 6 = $1.96

A) The distribution of large coffee prices is skewed to the right, centred around $2.00 , with most coffee shops charging between $1.95 and $2.03. The lowest and highest prices were $1.93 and $2.18. There is a gap in the distribution, no coffee shops charged between $2.08 and $2.16.
B) The distribution of large coffee prices is skewed to the right, centred around $2.00, with most coffee shops charging between $1.95 and $2.03. The lowest and highest prices were $1.93 and $2.03.
C) The distribution of large coffee prices is skewed to the right, centred around $1.95, with most coffee shops charging between $1.93 and $1.98. The lowest and highest prices were $1.93 and $2.03. There is a gap in the distribution, no coffee shops charged between $2.08 and $2.16.
D) The distribution of large coffee prices is skewed to the left, centred around $1.95, with most coffee shops charging between $1.93 and $1.98. The lowest and highest prices were $1.93 and $2.03. There is a gap in the distribution, no coffee shops charged between $2.08 and $2.16.
E) The distribution of large coffee prices is skewed to the left, centred around $2.00, with most coffee shops charging between $1.95 and $2.03. The lowest and highest prices were $1.93 and $2.03. There is a gap in the distribution, no coffee shops charged between $2.08 and $2.16.
Answer: A
Diff: 1   Type: BI
Objective: (3.8) Describe Situation Given Stemplot or Dotplot

14) A student at a local university took a total of 20 exams during freshman year. The student recorded the exam scores as percentages and created the following stem-and-leaf display. The lower stem contains leaves with the digits 0-4 and the upper stem contains leaves with digits 5-9. In addition to describing the distribution, give a reason to account for the shape of this distribution.

Exam Grades
```
9 | 5 5 5 5 5 5 6 7 8
9 | 2 3 4 4
8 | 5 6 7 8
8 |
7 | 9
7 |
6 |
6 | 1 4
5 |
```
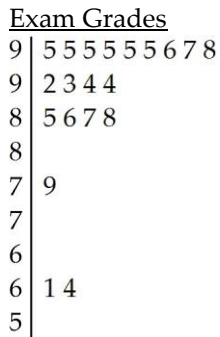
Key:
    9 | 3 = 93%

A) The distribution of exam scores is skewed to the left. Typically, the student scored 94% on exams, and the exam scores are tightly clustered in the 90s. Two exam scores are outliers, when the student scored below 65%. It is possible that the student had a difficult time with one of his or her courses in that year. Regardless of the possible reasons, these two scores were unusual compared to the student's other exam scores.

B) The distribution of exam scores is skewed to the left. Typically, the student scored 95% on exams, and the exam scores are tightly clustered in the 90s. Two exam scores are outliers, when the student scored below 65%. It is possible that the student had a difficult time with one of his or her courses in that year. Regardless of the possible reasons, these two scores were unusual compared to the student's other exam scores.

C) The distribution of exam scores is skewed to the right. Typically, the student scored 95% on exams, and the exam scores are tightly clustered in the 90s. Two exam scores are outliers, when the student scored below 65%. It is possible that the student had a difficult time with one of his or her courses in that year. Regardless of the possible reasons, these two scores were unusual compared to the student's other exam scores.

D) The distribution of exam scores is skewed to the left. Typically, the student scored 95% on exams, and the exam scores are tightly clustered in the upper 80s and lower 90s. Two exam scores are outliers, when the student scored below 65%. It is possible that the student had a difficult time with one of his or her courses in that year. Regardless of the possible reasons, these two scores were unusual compared to the student's other exam scores.
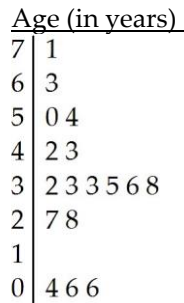
E) The distribution of exam scores is skewed to the left. Typically, the student scored 95% on exams, and the exam scores are tightly clustered in the 90s.

Answer: B

Diff: 1   Type: BI

Objective: (3.8) Describe Situation Given Stemplot or Dotplot

15) The stem-and-leaf diagram shows the ages of 17 people at a playground in London, Ontario.

Age (in years)
```
7 | 1
6 | 3
5 | 0 4
4 | 2 3
3 | 2 3 3 5 6 8
2 | 7 8
1 |
0 | 4 6 6
```

Key:
$3 \mid 3 = 33$ years

A) The distribution of the ages of people at the playground is skewed to the left, with a typical age between 32 and 38. With the exception of the 3 people less than 10 years old, the ages are between 27 and the maximum 71.

B) The distribution of the ages of people at the playground is skewed to the right, with a typical age between 42 and 54. With the exception of the 3 people less than 10 years old, the ages are between 27 and the maximum 71.

C) The distribution of the ages of people at the playground is skewed to the right, with a typical age between 27 and 71. There are 3 outliers, when people are less than 10 years old.

D) The distribution of the ages of people at the playground is skewed to the right, with a typical age between 32 and 38.

E) The distribution of the ages of people at the playground is skewed to the right, with a typical age between 32 and 38. With the exception of the 3 people less than 10 years old, the ages are between 27 and the maximum 71.
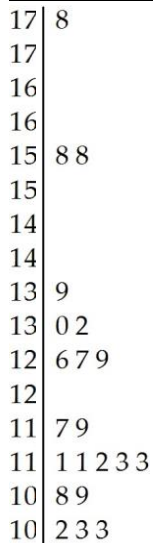
Answer: E
Diff: 1   Type: BI
Objective: (3.8) Describe Situation Given Stemplot or Dotplot

16) Members of the Ontario Field Ornithologists (OFO) observe birds at various locations within the province to see how many different species of bird they can spot. Suppose that 21 members have reported spotting the following number of species in 2014. The lower stem contains leaves with the digits 0-4 and the upper stem contains leaves with digits 5-9.

Ontario Bird Count Totals

```
17 | 8
17 |
16 |
16 |
15 | 8 8
15 |
14 |
14 |
13 | 9
13 | 0 2
12 | 6 7 9
12 |
11 | 7 9
11 | 1 1 2 3 3
10 | 8 9
10 | 2 3 3
```

Key:
11 │ 7 = 117 birds

A) The distribution of the number of birds spotted by OFO members in 2014 is skewed right, with a centre at around 125 birds. There are several high outliers, with two members spotting 158 birds and another spotting 178. With the exception of these outliers, most members saw between 102 and 139 birds.
B) The distribution of the number of birds spotted by OFO members in 2014 is skewed right, with a centre at around 111 birds. There are several high outliers, with two members spotting 158 birds and another spotting 178. With the exception of these outliers, most members saw between 102 and 139 birds.
C) The distribution of the number of birds spotted by OFO members in 2014 is skewed left, with a centre at around 111 birds. Most members saw between 102 and 178 birds.
D) The distribution of the number of birds spotted by OFO members in 2014 is skewed left, with a centre at around 111 birds. There are several high outliers, with two members spotting 158 birds and another spotting 178. With the exception of these outliers, most members saw between 102 and 139 birds.
E) The distribution of the number of birds spotted by OFO members in 2014 is skewed right, with a centre at around 111 birds. Most members saw between 102 and 178 birds.
Answer: B
Diff: 1   Type: BI
Objective: (3.8) Describe Situation Given Stemplot or Dotplot

17) The mathematics department at a Canadian university collected data for the number of students enrolled in 40 math courses over the course of one year. The following stem-and-leaf display shows the total number of students enrolled in each class.

Class Size Totals

```
12 | 2 3 3
11 | 4 5
10 | 2 4 6 8
 9 | 3 5 6 8
 8 | 2 2 5 8 8
 7 | 4 6 8
 6 | 2 2 3 5 9
 5 | 3 3 8 9
 4 | 2 3 3 6 6
 3 | 6 6 7 8 9
```

Key:
    10 | 6 = 106 students

A) The distribution of the number of students enrolled in each of 40 math courses is skewed to the left, with a typical class size of 89 students. The smallest class size was 36 and the largest was 123.
B) The distribution of the number of students enrolled in each of 40 math courses is unimodal and symmetric. The smallest class size was 36 and the largest was 123. The centre of the distribution was around 75 students.
C) The distribution of the number of students enrolled in each of 40 math courses is nearly uniform. The smallest class size was 36 and the largest was 123. The centre of the distribution was around 89 students.
D) The distribution of the number of students enrolled in each of 40 math courses is nearly uniform. The smallest class size was 36 and the largest was 123. The centre of the distribution was around 75 students.
E) The distribution of the number of students enrolled in each of 40 math courses is skewed to the right, with a typical class size of 69 students. The smallest class size was 36 and the largest was 123.
Answer: D
Diff: 1   Type: BI
Objective: (3.8) Describe Situation Given Stemplot or Dotplot

18) The following stem-and-leaf display shows the number of homeless cats and dogs that had to be euthanized each year in a large city for the period 1995-2014.

Animal Totals
```
90 | 2
89 | 3
88 | 5 5 5 7
87 | 1 5 7
86 |
85 |
84 | 2
83 |
82 | 3 3 5 7
81 | 2 2 3 5 5 6
```

Key:
    87 | 5 = 87,500 cats and dogs euthanized

A) The distribution of the number of cats and dogs that were euthanized is skewed to the right, and has several modes, with gaps in between. One mode is clustered between 87,000 and 90,000 euthanized, a second mode at 84,000, and a third mode with a cluster between 81,000 and 82,000.
B) The distribution of the number of cats and dogs that were euthanized is bimodal. The upper cluster is between 89,000 and 90,000 euthanized, with a centre at around 89,500. The lower cluster is between 81,000 and 82,000 euthanized, with a centre at around 81,200.
C) The distribution of the number of cats and dogs that were euthanized is bimodal. The upper cluster is between 87,000 and 90,000 euthanized, with a centre at around 88,500. The lower cluster is between 81,000 and 83,000 euthanized, with a centre at around 81,200.
D) The distribution of the number of cats and dogs that were euthanized is skewed to the right, with a centre at around 85,500. The number of cats and dogs euthanized each year ranges from 81,200 to 90,200.
E) The distribution of the number of cats and dogs that were euthanized is unimodal, ranging from 81,200 to 90,200 euthanized. The centre of the distribution is at around 85,500.
Answer: C
Diff: 1   Type: BI
Objective: (3.8) Describe Situation Given Stemplot or Dotplot

19) A business owner recorded her annual profits for the first 12 years since opening her business. The stem-and-leaf display below shows the annual profits in thousands of dollars.

Annual Profit Totals
```
14 | 0 1 3 3
13 | 8
12 |
11 | 0 1 2
10 | 8
 9 |
 8 | 1 3
 7 | 7
```

Key:
    13 | 8 = $138,000 profit

A) The distribution of the business owner's profits is skewed to the left, and is multimodal, with gaps in between. Five years the business had profits near $140,000, another four years the business had profits near $110,000, and three years the business had profits near $80,000.
B) The distribution of the business owner's profits is skewed to the right, and is unimodal, with gaps in between. The centre is at around $110,000.
C) The distribution of the business owner's profits is skewed to the right, and is multimodal, with gaps in between. Five years the business had profits near $140,000, another four years the business had profits near $110,000, and three years the business had profits near $80,000.
D) The distribution of the business owner's profits is skewed to the left, and is unimodal, with gaps in between. The centre is at around $110,000.
E) The distribution of the business owner's profits is skewed to the left, and is multimodal, with gaps in between. Five years the business had profits near $130,000, another four years the business had profits near $100,000, and three years the business had profits near $70,000.
Answer: A
Diff: 1   Type: BI
Objective: (3.8) Describe Situation Given Stemplot or Dotplot

20) A dotplot of the number of tornadoes each year in a certain county from 1948 to 2004 is given. Each dot represents a year in which there were that many tornadoes.
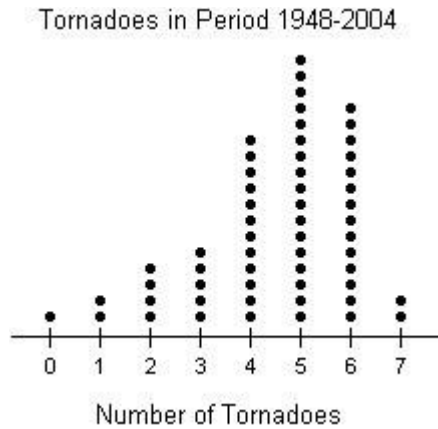
Tornadoes in Period 1948-2004

Number of Tornadoes

A) The distribution of the number of tornadoes per year is unimodal and symmetric, with a centre around 5 tornadoes per year. The number of tornadoes per year ranges from 0 to 7.
B) The distribution of the number of tornadoes per year is unimodal and skewed to the left, with a centre around 3.5 tornadoes per year. The number of tornadoes per year ranges from 0 to 7.
C) The distribution of the number of tornadoes per year is unimodal and symmetric, with a centre around 3.5 tornadoes per year. The number of tornadoes per year ranges from 0 to 7.
D) The distribution of the number of tornadoes per year is unimodal and skewed to the left, with a centre around 5 tornadoes per year. The number of tornadoes per year ranges from 0 to 7.
E) The distribution of the number of tornadoes per year is unimodal and skewed to the right, with a centre around 5 tornadoes per year. The number of tornadoes per year ranges from 0 to 7.
Answer: D
Diff: 1   Type: BI
Objective: (3.8) Describe Situation Given Stemplot or Dotplot

3.3 Centre

Find the median of the data.

1) Here are the number of baseball games that Dave attended over the last several seasons.

1   15   17   21   30   30   49
A) 17 games
B) 24 games
C) 21 games
D) 30 games
E) 25.5 games
Answer: C
Diff: 1   Type: BI
Objective: (3.3) Find Median

2) The annual incomes, in dollars, of several doctors are listed below.

130,000 132,000 188,000 242,000 238,000
148,000 114,000 833,000 200,000 151,000
A) $238,000
B) $188,000
C) $169,500
D) $264,000
E) $151,000
Answer: C
Diff: 1   Type: BI
Objective: (3.3) Find Median

3) A new business had the following monthly revenues, in dollars.

6110   2729   1950   8233   8610
3144   1130   7269   4841   5175
A) $4919.10
B) $5008.00
C) $4841.00
D) $5465.67
E) $5175.00
Answer: B
Diff: 1   Type: BI
Objective: (3.3) Find Median

4) A substitute teacher traveled the following distances, in kilometres, to arrive at work.

10 15 19 21 27 32 55
A) 21
B) 24
C) 26
D) 20
E) 55
Answer: A
Diff: 1   Type: BI
Objective: (3.3) Find Median

5) A store manager kept track of the number of newspapers sold each week. The results are shown below.

89 30 203 193 261 249 246

A) 182 newspapers
B) 203 newspapers
C) 261 newspapers
D) 193 newspapers
E) 246 newspapers
Answer: B
Diff: 1   Type: BI
Objective: (3.3) Find Median

6) The number of cars passing through a Tim Hortons "drive-thru" during each 15-minute period was recorded. The results are shown below.

20	22	20	23
23	20	25	22
30	26	26	24
19	26	20	15
10	22	22	22

A) 20 cars
B) 23 cars
C) 22 cars
D) 21.85 cars
E) 26 cars
Answer: C
Diff: 1   Type: BI
Objective: (3.3) Find Median

7) Here are the weights, in grams, of several snack crackers.

25.23 34.59 22.11 45.93 19.56 22.40 31.18
34.59 43.37 27.22 25.23 36.00 39.69 20.13
13.32 36.00 22.40 39.69 48.76 19.56 15.88

A) 25.23
B) 22.40
C) 27.22
D) 34.59
E) 13.32
Answer: C
Diff: 1   Type: BI
Objective: (3.3) Find Median

8) The precipitation, in millimetres, for August is given for 20 different Canadian cities.

113	67	56	43	27
93	58	147	72	58
86	74	39	25	36
103	50	37	36	82

A) 67
B) 56
C) 58
D) 65
E) 36
Answer: C
Diff: 1   Type: BI
Objective: (3.3) Find Median

9) The stem-and-leaf display shows the results of a math test written by 30 students.

```
10 | 0
 9 | 1 1
 8 | 0 1 1 1 1 2 3 5 5 6 6 8 9
 7 | 5 5 6 8 8 9
 6 | 3 7 7 8
 5 | 4 8
 4 |
 3 | 4
 2 | 7
 1 |
 0 |
```

A) 79
B) 81.5
C) 87
D) 80.5
E) 88.5
Answer: D
Diff: 1   Type: BI
Objective: (3.3) Find Median

10) A small company employs a supervisor at $1300 a week, an inventory manager at $600 a week, 5 stock boys at $300 a week each, and 3 drivers at $500 a week each.
A) $300
B) $500
C) $400
D) $600
E) $490
Answer: C
Diff: 2   Type: BI
Objective: (3.3) Find Median

3.4 Spread

1) The test scores of 15 students are listed below. Find the lower quartile (Q1) by hand.

41   49   50   55   58
64   65   68   72   76
85   87   90   94   95

A) 55
B) 56.5
C) 58
D) 85
E) 86
Answer: A
Diff: 1   Type: BI
Objective: (3.4) Find Range, Quartile, or Interquartile Range

2) The test scores of 19 students are listed below. Find the upper quartile (Q3) by hand.

36   45   49   53   55
56   59   61   62   65
67   71   75   79   82
88   90   92   97

A) 55.5
B) 82.0
C) 65.0
D) 79.0
E) 80.5
Answer: B
Diff: 1   Type: BI
Objective: (3.4) Find Range, Quartile, or Interquartile Range

3) The test scores of 19 students are listed below. Find the interquartile range (IQR) by hand.

91   47   86   70   59
64   97   55   90   78
82   83   50   88   75
43   92   94   67

A) 25
B) 31.5
C) 31
D) 30.5
E) 27.5
Answer: C
Diff: 2   Type: BI
Objective: (3.4) Find Range, Quartile, or Interquartile Range

4) The test scores of 19 students are listed below. Find the range.

91	99	86	54	72
85	97	91	90	66
82	83	78	88	77
80	92	94	98	

A) (54, 99)
B) (66, 99)
C) 33
D) 45
E) 44
Answer: D
Diff: 1   Type: BI
Objective: (3.4) Find Range, Quartile, or Interquartile Range

5) The weekly salaries, in dollars, of 16 government workers are listed below. Find the lower quartile (Q1) by hand.

$690 $589 $813 $656
$728 $556 $491 $614
$532 $662 $685 $462
$542 $787 $511 $826

A) $542.00
B) $537.00
C) $491.00
D) $534.50
E) $532.00
Answer: B
Diff: 1   Type: BI
Objective: (3.4) Find Range, Quartile, or Interquartile Range

6) The weekly salaries, in dollars, of 16 government workers are listed below. Find the upper quartile (Q3) by hand.

$492	$791	$545	$840
$506	$734	$620	$815
$676	$874	$450	$561
$713	$473	$654	$527

A) $734.00
B) $776.75
C) $791.00
D) $654.00
E) $762.50
Answer: E
Diff: 1   Type: BI
Objective: (3.4) Find Range, Quartile, or Interquartile Range

7) The semester point totals of 16 students are listed below. Find the interquartile range (IQR) by hand.

787	640	820	677
475	611	527	667
574	687	875	512
592	460	542	490

A) 297
B) 165
C) 162.5
D) 592
E) 611
Answer: C
Diff: 2   Type: BI
Objective: (3.4) Find Range, Quartile, or Interquartile Range

8) The weights, in kilograms, of 18 randomly selected adults are given below. Find the range.

54.4	74.8	84.8	64.9	54.0	59.9
57.6	70.8	81.2	72.1	81.6	91.6
51.7	66.2	68.5	76.2	78.5	65.3

A) (51.7 kg, 91.6 kg)
B) (54.4 kg, 91.6 kg)
C) 91.6 kg
D) 37.2 kg
E) 39.9 kg
Answer: E
Diff: 1   Type: BI
Objective: (3.4) Find Range, Quartile, or Interquartile Range

9) The weights, in kilograms, of 17 randomly selected adults are given below. Find the interquartile range (IQR) by hand.

65.3	74.8	84.8	64.9	54.0	59.9
57.6	70.8	81.2	72.1	81.6	91.6
51.7	66.2	68.5	76.2	78.5	

A) 21.3 kg
B) 51.7 kg
C) 17.5 kg
D) 13.6 kg
E) 39.9 kg
Answer: C
Diff: 2   Type: BI
Objective: (3.4) Find Range, Quartile, or Interquartile Range

10) Here are costs (in dollars) of 12 refrigerators. Find the range.

845 970 635 545 1445 1070
670 745 780 1270 535 1045

A) $905
B) $920
C) $915
D) $900
E) $910
Answer: E
Diff: 1   Type: BI
Objective: (3.4) Find Range, Quartile, or Interquartile Range

11) A local ice cream shop hand scoops each of its ice cream cones. The cones vary in weight from 140 grams to 305 grams with a mean of 181 grams and a standard deviation of 34 grams. The quartiles and median weights are 148, 246, and 202 grams. Find the range and IQR of the weights.
A) Range: 41 grams; IQR: 53 grams
B) Range: 98 grams; IQR: 165 grams
C) Range: 445 grams; IQR: 98 grams
D) Range: 41 grams; IQR: 165 grams
E) Range: 165 grams; IQR: 98 grams
Answer: E
Diff: 1   Type: BI
Objective: (3.4) Find Range, Quartile, or Interquartile Range

Use summary statistics to answer the question.

12) Here are some statistics for the annual Wildcat golf tournament:
lowest score = 57
mean score = 97
median = 105
range = 93
IQR = 109
Q1 = 39
standard deviation = 14

Between what two values are the middle 50% of the scores found?
A) 26.25 and 78.75
B) 39 and 148
C) 97 and 105
D) 57 and 150
E) 24.25 and 67.9
Answer: B
Diff: 2   Type: BI
Objective: (3.4) Find Range, Quartile, or Interquartile Range

13) Here are some summary statistics for all of the runners in a local 12 kilometre race:

slowest time = 121 minutes
mean = 76 minutes
median = 76 minutes
range = 91 minutes
IQR = 57
Q1 = 30
standard deviation = 13 minutes

Between what two values are the middle 50% of times?
A) 30 and 87
B) 38 and 76
C) 15.2 and 60.8
D) 19 and 57
E) 121 and 30
Answer: A
Diff: 2   Type: BI
Objective: (3.4) Find Range, Quartile, or Interquartile Range

14) Here are the summary statistics for the monthly payroll for an accounting firm: lowest salary = $15,000, mean salary = $35,000, median = $25,000, range = $60,000, IQR = $30,000, first quartile = $17,500, standard deviation = $20,000.

Between what two values are the middle 50% of the salaries found?
A) $15,000 and $75,000
B) $17,500 and $37,500
C) $17,500 and $30,000
D) $35,000 and $25,000
E) $17,500 and $47,500
Answer: E
Diff: 2   Type: BI
Objective: (3.4) Find Range, Quartile, or Interquartile Range

15) Here are some summary statistics for the recent English exam: lowest score = 31, mean score = 67, median = 81.2, range = 79, IQR = 60, Q1 = 27, standard deviation = 8.6. Between what two values are the middle 50% of the scores found?
A) 31 and 110
B) 67 and 81.2
C) 27 and 87
D) 16.75 and 50.25
E) 20.3 and 60.9
Answer: C
Diff: 2   Type: BI
Objective: (3.4) Find Range, Quartile, or Interquartile Range

16) Here are some summary statistics for annual snowfall in a certain town compiled over the last 15 years: lowest amount = 18 cm, mean = 49 cm, median = 42 cm, range = 82 cm, IQR = 50, Q1 = 20, standard deviation = 10 cm. Between what two values are the middle 50% of snowfall found?
A) 20 and 70
B) 12.25 and 36.75
C) 49 and 42
D) 10.5 and 31.5
E) 18 and 100
Answer: A
Diff: 2   Type: BI
Objective: (3.4) Find Range, Quartile, or Interquartile Range

17) Here are some summary statistics for last year's basketball team scoring output: lowest score = 23 points, mean = 53 points, median = 47 points, range = 92 points, IQR = 51, Q1 = 32, standard deviation = 5 points. Between what two values are the middle 50% of scores found?
A) 53 and 47
B) 23 and 115
C) 13.25 and 3975
D) 32 and 83
E) 11.75 and 35.25
Answer: D
Diff: 2   Type: BI
Objective: (3.4) Find Range, Quartile, or Interquartile Range

18) Here are some summary statistics for the size of forest fires last year: smallest fire = 72 acres, mean = 493 acres, median = 493 acres, range = 7928 acres, IQR = 370, Q1 = 197, standard deviation = 59 acres. Between what two values are the middle 50% of fire sizes found?
A) 123.25 and 369.75
B) 98.6 and 394.4
C) 197 and 567
D) 72 and 8000
E) 246.5 and 493
Answer: C
Diff: 2   Type: BI
Objective: (3.4) Find Range, Quartile, or Interquartile Range

3.5   Boxplots and 5-Number Summary

Find the five-number summary for the given data by hand.

1) The test scores of 15 students are listed below.

41 44 48 55 59
61 67 71 72 78
85 87 90 94 95
A) 41, 57, 68, 86, 95
B) 41, 53.25, 70.0, 85.5, 95
C) 41, 53.25, 68, 85.5, 95
D) 41, 55, 71, 87, 95
Answer: D
Diff: 2   Type: BI
Objective: (3.5) Find Five-Number Summary

2) The weekly salaries (in dollars) of sixteen government workers are listed below.

690 594   813 636
728 585   486 634
534 679   685 451
558 787   503 826
A) 451, 540, 635, 718.5, 826 dollars
B) 451, 540, 634, 718.5, 826 dollars
C) 451, 546, 635, 709, 826 dollars
D) 451, 534, 634, 690, 826 dollars
Answer: C
Diff: 2   Type: BI
Objective: (3.5) Find Five-Number Summary

3) The normal annual precipitation (in millimetres) is given below for 21 different cities.

39.1   30.6   18.5   35.0   27.1   27.8   8.6
23.2   42.6   34.7   21.2   12.0   5.1   14.4
22.7   10.9   16.0   25.4   17.2   14.7   51.7
A) 5.1, 14.475, 22.7, 29.900, 51.7 mm
B) 5.1, 14.55, 22.7, 32.65, 51.7 mm
C) 5.1, 14.7, 22.7, 30.6, 51.7 mm
D) 5.1, 14.475, 21.95, 29.900, 51.7 mm
Answer: B
Diff: 2   Type: BI
Objective: (3.5) Find Five-Number Summary

4) The heights, in centimetres, of 18 randomly selected Grade 8 students are given below.

120 145   187 155   119 136
127 141   179 163   182 202
114 171   134 150   167 171

A) 114, 130.50, 150, 169.0, 202 cm
B) 114, 130.50, 152.5, 169.0, 202 cm
C) 114, 134, 152.5, 171, 202 cm
D) 114, 132.25, 150, 173.00, 202 cm
Answer: C
Diff: 2   Type: BI
Objective: (3.5) Find Five-Number Summary

5) A small company employs a supervisor at $1300 a week, an inventory manager at $900 a week, 5 stock boys at $400 a week, and 3 drivers at $500 a week.
A) 1300, 400, 450, 500, 400 dollars
B) 400, 400, 450, 500, 1300 dollars
C) 400, 400, 900, 500, 1300 dollars
D) 2000, 400, 450, 1500, 1300 dollars
E) 400, 400, 450, 900, 1300 dollars
Answer: B
Diff: 2   Type: BI
Objective: (3.5) Find Five-Number Summary

6) The frequency table shows the weight, in kilograms, of 120 adults, rounded to the nearest kilogram.

Weight	Count	Weight	Count
60	1	68	12
61	6	69	6
62	7	70	3
63	5	71	12
64	8	72	10
65	7	73	2
66	7	74	4
67	25	75	5

A) 60, 65, 67, 70, 75 kg
B) 60, 65, 66, 70, 75 kg
C) 60, 65, 67, 71, 75 kg
D) 60, 66, 67, 70, 75 kg
E) 60, 65, 66, 71, 75 kg
Answer: C
Diff: 2   Type: BI
Objective: (3.5) Find Five-Number Summary

7) The frequency table shows the weight, in kilograms, of 130 adults, rounded to the nearest kilogram.

Weight	Count	Weight	Count
60	3	68	23
61	4	69	6
62	4	70	13
63	8	71	10
64	8	72	9
65	5	73	6
66	9	74	4
67	16	75	2

A) 60, 66, 67, 70, 75 kg
B) 60, 65.5, 68, 70, 75 kg
C) 60, 66, 67, 71, 75 kg
D) 60, 65, 68, 70, 75 kg
E) 60, 65, 68, 71, 75 kg
Answer: B
Diff: 2   Type: BI
Objective: (3.5) Find Five-Number Summary

8) Here are the average mathematics achievement scores for ninth graders in 34 counties.

592 588 587 586 582 580 561 555 549
548 542 540 538 537 534 532 531 527
515 512 501 498 493 489 485 470 465
462 458 444 435 431 407 376

A) 376, 485, 529, 555, 592
B) 376, 485, 531, 549, 592
C) 376, 470, 527, 549, 592
D) 376, 470, 531, 549, 592
E) 376, 470, 529, 549, 592
Answer: E
Diff: 2   Type: BI
Objective: (3.5) Find Five-Number Summary

9) Here are the average mathematics achievement scores for ninth graders in 32 counties.

607 585 574 572 569 565 564 558
542 534 531 528 525 524 519 516
498 480 478 475 471 465 458 446
419 410 409 389 380 382 355 324

A) 324, 419, 419, 542, 607
B) 324, 432.5, 507, 550, 607
C) 324, 446, 507, 558, 607
D) 324, 419, 516, 542, 607
E) 324, 419, 507, 542, 607
Answer: B
Diff: 2   Type: BI
Objective: (3.5) Find Five-Number Summary

3.6   The Centre of Symmetric Distributions: The Mean

Find the mean of the data.

1) John liked to order the all-you-can-eat shrimp at his favorite restaurant. Here are the number of shrimp he ate during his last five visits to the restaurant.

15, 16, 13, 15, 10
A) 15 shrimp
B) 13 shrimp
C) 13.8 shrimp
D) 17.3 shrimp
E) 10 shrimp
Answer: C
Diff: 2   Type: BI
Objective: (3.6) Find Mean

2) The students in a math class took the Scholastic Aptitude Test. Their math scores are shown below.

| 567 | 630 | 350 | 353 | 503 |
| 356 | 354 | 552 | 470 | 482 |

A) 461.7
B) 476.0
C) 552.1
D) 452.6
E) 471.1
Answer: A
Diff: 2   Type: BI
Objective: (3.6) Find Mean

3) Last year, nine employees of an electronics company retired. Their ages at retirement, in years, are listed below.

55	63	64
50	60	58
67	50	50

Round your answer to the nearest tenth.
A) 61.0 years old
B) 55.5 years old
C) 56.8 years old
D) 57.4 years old
E) 56.2 years old
Answer: D
Diff: 2   Type: BI
Objective: (3.6) Find Mean

4) Here are the grocery bills, in dollars, for six shoppers.

$73.92 $80.29 $76.84 $46.02 $42.86 $47.52

Round your answer to the nearest cent.
A) $91.86
B) $46.02
C) $73.49
D) $61.49
E) $61.24
Answer: E
Diff: 2   Type: BI
Objective: (3.6) Find Mean

5) Here are the amounts, in dollars, spent by six students at a university book store.

$267.25 $167.42 $288.70 $148.22 $228.43 $174.68

Round your answer to the nearest cent.
A) $242.94
B) $318.67
C) $254.94
D) $167.42
E) $212.45
Answer: E
Diff: 2   Type: BI
Objective: (3.6) Find Mean

6) The employees at Frank's Furniture earned the following amounts, in dollars, last week.

$540.68 $186.11 $264.76 $495.65 $156.26 $533.66

Round your answer to the nearest cent.
A) $423.42
B) $435.42
C) $544.28
D) $533.66
E) $362.85
Answer: E
Diff: 2   Type: BI
Objective: (3.6) Find Mean

7) Jody got a bank statement each month that listed the balance, in dollars, in her checking account. Here are the balances on several statements.

$508.73 $191.48 $535.85 $381.72 $315.88
$485.86 $533.66 $508.12 $515.49

Round your answer to the nearest cent.
A) $497.10
B) $381.72
C) $435.20
D) $441.87
E) $568.11
Answer: D
Diff: 2   Type: BI
Objective: (3.6) Find Mean

8) The local Tupperware dealers earned the following commissions, in dollars, last month.

$1863.64	$4955.86	$3482.51
$2342.19	$4773.76	$4720.40
$2050.10	$4263.18	$4897.60
$3314.73		

Round your answer to the nearest cent.
A) $4073.77
B) $3660.40
C) $2342.19
D) $3666.40
E) $4583.00
Answer: D
Diff: 2   Type: BI
Objective: (3.6) Find Mean

9) Here are the number of hours that Bill has exercised each week since he started keeping records.

8.5	6.5	7.1	8.7	6.9	8.5
8.6	7.1	7.8	8.5	8.7	7.9
8.6	6.5	6.5	8.8	6.9	8.6

Round your answer to the nearest tenth.
A) 8.3 hours
B) 9.3 hours
C) 8.0 hours
D) 7.8 hours
E) 7.4 hours
Answer: D
Diff: 2   Type: BI
Objective: (3.6) Find Mean

10) A small company employs a supervisor at $1400 a week, an inventory manager at $800 a week, 8 stock boys at $300 a week each, and 6 drivers at $700 a week each.
A) $2200
B) $733
C) $500
D) $300
E) $550
Answer: E
Diff: 2   Type: BI
Objective: (3.6) Find Mean

11) Two sections of a class took the same quiz. Section A had 15 students who had a mean score of 80, and Section B had 20 students who had a mean score of 90. Overall, what was the approximate mean score for all of the students on the quiz?
A) 84.3
B) 85.0
C) 85.7
D) none of these
E) It cannot be determined.
Answer: C
Diff: 2   Type: BI
Objective: (3.6) Find Mean

12) Last weekend police ticketed 18 men whose mean speed was 72 miles per hour, and 30 women going an average of 64 mph. Overall, what was the mean speed of all the people ticketed?
A) 67 mph
B) 68 mph
C) 69 mph
D) none of those
E) It cannot be determined.
Answer: A
Diff: 2   Type: BI
Objective: (3.6) Find Mean

13) A consumer group surveyed the prices for a certain item in five different stores and reported the mean price to be $15. If you visited four of these stores and found their prices to $10, $15, $17, and $25, what is the price of this item at the fifth store?
A) $8
B) $10
C) $12
D) $15
E) It cannot be determined.
Answer: A
Diff: 3   Type: BI
Objective: (3.6) Find Mean

14) A particular student has a grade point average (GPA) of 2.5 in their first three courses. What is the minimum average they will need in their fourth and fifth courses so that their overall GPA on all five courses is at least 3.0?
A) 3.00
B) 3.25
C) 3.50
D) 3.75
E) It cannot be determined.
Answer: D
Diff: 3   Type: BI
Objective: (3.6) Find Mean

3.7   The Spread of Symmetric Distributions: The Standard Deviation

1) Here are the commutes (in kilometres) for a group of six employees. Find the standard deviation.

    36.9   17.9   43.1   72.6   22.7   21.4
A) 421.6
B) 214.6
C) 72.6
D) 20.5
E) 98.9
Answer: D
Diff: 3   Type: BI
Objective: (3.7) Find Standard Deviation

2) Here are the prices for 8 different CD players. Find the standard deviation.

        $254 $323 $268 $446 $222 $313 $308 $144
A) $87.65
B) $648,660.50
C) $183.00
D) $702,438.00
E) $222
Answer: A
Diff: 3   Type: BI
Objective: (3.7) Find Standard Deviation

3) The weights (in kilograms) of 27 dogs are listed below. Find the standard deviation.

```
1.7  2.0  2.2  2.2  2.4  2.5  2.5  2.5  2.6
2.6  2.6  2.6  2.6  2.7  2.8  2.8  2.8  2.9
2.9  2.9  3.0  3.0  3.1  3.1  3.3  3.6  4.2
```

A) 0.50 kg
B) 0.49 kg
C) 0.24 kg
D) 6.27 kg
E) 0.51 kg
Answer: B
Diff: 3   Type: BI
Objective: (3.7) Find Standard Deviation

4) The ages of the 21 members of a track and field team are listed below. Find the standard deviation.

```
15 18      18      19      22      23      24
24 24      25      25      26      26      27
28 28      30      32      33      40      42
```

A) 6.5
B) 6.6
C) 6.7
D) 6.4
E) 6.3
Answer: C
Diff: 3   Type: BI
Objective: (3.7) Find Standard Deviation

5) Here are the average mathematics achievement scores for ninth graders in 34 counties. Find the standard deviation.

```
595  588  587  586  582  580  561  555  551
548  542  540  538  537  534  532  524  523
515  512  501  498  493  489  485  483  465
462  458  444  435  431  407  380
```

A) 55.8
B) 57.5
C) 54.2
D) 56.2
E) 55.2
Answer: E
Diff: 3   Type: BI
Objective: (3.7) Find Standard Deviation

6) Here are the average mathematics achievement scores for ninth graders in 32 counties. Find the standard deviation.

```
599 585 574 572 569 565 564 551
539 534 531 528 525 524 519 501
488 480 478 475 471 465 458 443
427 410 409 389 380 382 355 314
```

A) 75.3
B) 75
C) 73.3
D) 74.3
E) 75.5
Answer: D
Diff: 3   Type: BI
Objective: (3.7) Find Standard Deviation

7) Which set has the largest standard deviation?

Set 1	Set 2
3 7 7 7 10	3 6 7 8 10

A) Neither, because set 1 and set 2 have the same standard deviation.
B) Set 1, because 7 and 7 in set 1 are farther from 7 than 6 and 8 in set 2.
C) Set 1, because 6 and 8 in set 1 are farther from 7 than 7 and 7 in set 2.
D) Set 2, because 6 and 8 in set 2 are farther from 7 than 7 and 7 in set 1.
E) Set 2, because 7 and 7 in set 2 are farther from 7 than 6 and 8 in set 1.
Answer: D
Diff: 1   Type: BI
Objective: (3.7) Find Standard Deviation

8) Which set has the largest standard deviation?

Set 1	Set 2
80 110 120 130 180	10 40 50 60 110

A) Set 2, because 80 and 180 in set 1 are larger than 10 and 110 in set 2.
B) Neither, because the values in set 1 are just the values in set 2 plus 70.
C) Set 1, because 180 in set 1 is larger than 110 in set 2.
D) Set 1, because 80 and 180 in set 1 are larger than 10 and 110 in set 2.
E) Set 2, because set 2 has a smaller range than set 1.
Answer: B
Diff: 1   Type: BI
Objective: (3.7) Find Standard Deviation

9) Which set has the largest standard deviation?

Set 1	Set 2
7 13 15 14 19	52 60 62 61 68

A) Set 2, because set 2 has a wider range and will have a smaller SD.
B) Set 1, because set 1 has a narrower range and will have a larger SD.
C) Set 1, because the minimum and maximum in set 1 are farther from the centre.
D) Neither, because the values in set 2 are just the values in set 1 plus 45.
E) Set 2, because the minimum and maximum in set 2 are farther from the centre.
Answer: E
Diff: 1   Type: BI
Objective: (3.7) Find Standard Deviation

3.8 Summary

1) A small company employs a supervisor at $1300 a week, an inventory manager at $800 a week, 7 stock
boys at $400 a week, and 5 drivers at $700 a week. Which measure of centre best describes a typical wage
at this company, the mean at $600 or the median at $550?
A) Mean, because the distribution is symmetric.
B) Median, because of the outlier $1300.
C) Mean, because there are no outliers.
D) Median, because the distribution is skewed to the left.
E) Median, because of the outliers $800 and $1300.
Answer: B
Diff: 1   Type: BI
Objective: (3.8) Find Appropriate Measure of centre/Spread

2) A small company employs a supervisor at $1100 a week, an inventory manager at $700 a week, 6 stock
boys at $400 a week, and 4 drivers at $600 a week. Which measure of spread, would best describe the
payroll, the range, the IQR, or the standard deviation?
A) IQR, because the distribution is symmetric.
B) Range, because it would be least sensitive to the outlier at $1100.
C) Standard deviation, because it would be least sensitive to the outlier at $1100.
D) IQR, because it would be least sensitive to the outliers at $700 and $1100.
E) IQR, because it would be least sensitive to the outlier at $1100.
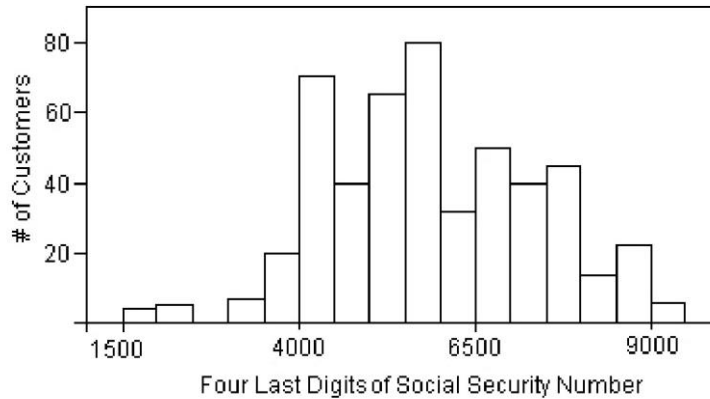Answer: E
Diff: 1   Type: BI
Objective: (3.8) Find Appropriate Measure of centre/Spread

3) Here are summary statistics of the four last digits of social security number of 500 customers, corresponding to the following histogram.

Count	500
Mean	4919
StdDev	1556
Median	5009
IQR	2009
Q1	4018
Q3	6027

Is the mean or median a "better" summary of the centre of the distribution?
A) Neither, because these are not categorical data.
B) Neither, because these are not quantitative data.
C) Median, because the IQR is smaller than the standard deviation.
D) Mean, because the distribution is quite symmetric.
E) Median, because of the outliers.
Answer: B
Diff: 2   Type: BI
Objective: (3.8) Find Appropriate Measure of centre/Spread

4) Office workers were asked how long it took them to travel to work one morning. Here is the stem-and-leaf display.

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

Would you use the median or the mean to describe the centre of this distribution?
A) Mean, because the data are skewed to the right.
B) Median, because the data are skewed to the left.
C) Mean, because the data are skewed to the left.
D) Mean, because the data are symmetric.
E) Median, because the data are skewed to the right.
Answer: E
Diff: 1   Type: BI
Objective: (3.8) Find Appropriate Measure of centre/Spread

5) Office workers were asked how long it took them to travel to work one morning. Here is the stem-and-leaf display.

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

Without actually finding the mean and the median, would you expect the mean to be higher or lower than the median?
A) Lower, because the data are skewed to the right.
B) Lower, because the data are skewed to the left.
C) Higher, because the data are skewed to the left.
D) Higher, because the data are skewed to the right.
E) Neither, because the mean would be equal to the median.
Answer: D
Diff: 1   Type: BI
Objective: (3.8) Find Appropriate Measure of centre/Spread

6) Here is the stem-and-leaf display of the midterm test scores for the seventh-period typing class.

```
5 | 9
6 | 3 5 8
7 | 2 4 4 7 9
8 | 3 5 5 8
9 | 1 3 7
```

Would you use the median or the mean to describe the centre of this distribution?
A) Median, because the data are skewed to the left.
B) Mean, because the data are skewed to the left.
C) Mean, because the data are quite symmetric.
D) Mean, because the data are skewed to the right.
E) Median, because the data are skewed to the right.
Answer: C
Diff: 1   Type: BI
Objective: (3.8) Find Appropriate Measure of centre/Spread

7) Shown below are the histogram and summary statistics for the reading scores of 29 fifth graders.
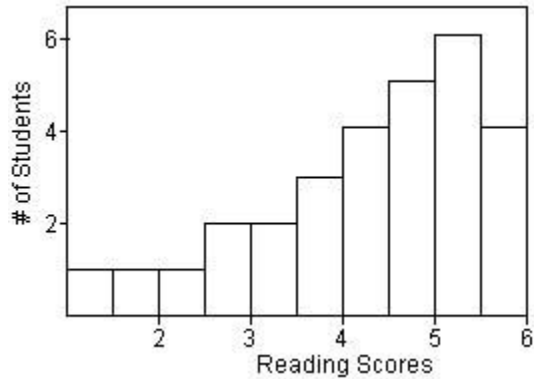
Count	Mean	Median	StdDev	Min	Max	Q1	Q3
29	4.2	4.6	1.3	1.3	5.9	3.5	5.4

Which measures of centre and spread would you use for this distribution?
A) Mean and IQR, because the data is skewed to the left.
B) Median and standard deviation, because the data is skewed to the left.
C) Mean and standard deviation, because the data is skewed to the left.
D) Mean and standard deviation, because the data is symmetric.
E) Median and IQR, because the data is skewed to the left.
Answer: E
Diff: 1   Type: BI
Objective: (3.8) Find Appropriate Measure of centre/Spread

8) The histograms display the body fat percentages of 42 female students and 48 male students taking a college health course. For which of the variables depicted in the histograms would you be most satisfied to summarize the centre with a mean? Explain.
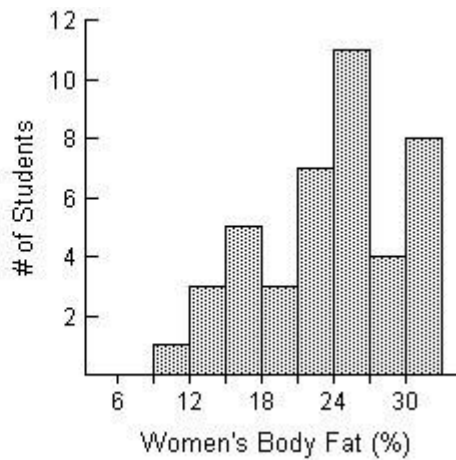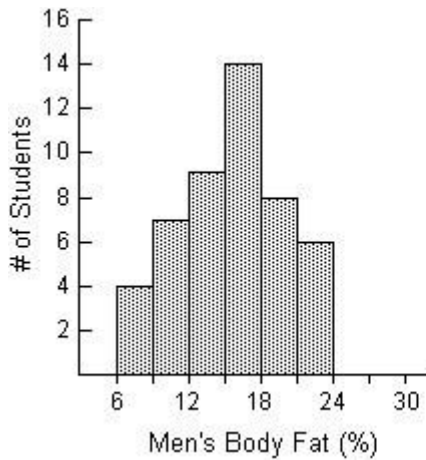

A) The histogram of Women's Body Fat is skewed on the left. That makes it the best candidate of summarizing with a mean.
B) The histogram of Women's Body Fat shows no outliers. That makes it the best candidate of summarizing with a mean.
C) The histogram of Men's Body Fat is most nearly symmetric, is not strongly skewed and shows no outliers. That makes it the best candidate of summarizing with a mean.
D) The histogram of Women's Body Fat is most nearly symmetric, is not strongly skewed and shows no outliers. That makes it the best candidate of summarizing with a mean.
E) The histogram of Men's Body Fat is skewed on the left. That makes it the best candidate of summarizing with a mean.
Answer: C
Diff: 1   Type: BI
Objective: (3.8) Find Appropriate Measure of centre/Spread

9) The histograms show the cost of living, in dollars, for 32 U.S. cities. The histogram on the left shows the cost of living for the 32 cities using bins $10 wide, and the histogram on the right displays the same data using bins that are $6 wide. For which of the histograms would you most strenuously insist on using an IQR rather than a standard deviation to summarize spread? Explain.
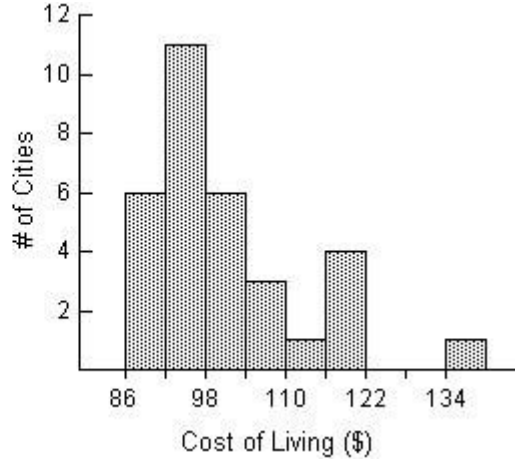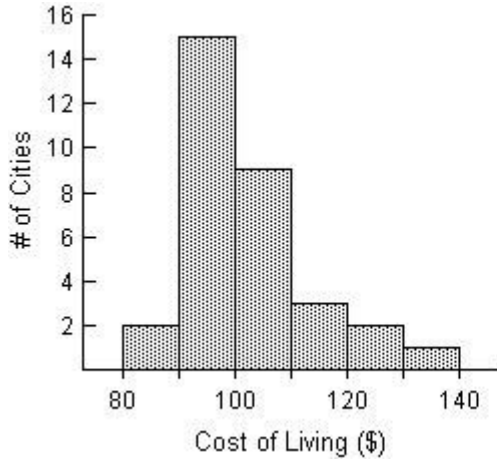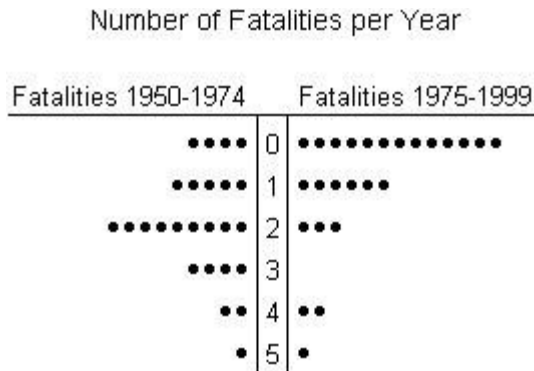

A) The histogram on the right is most nearly symmetric and shows no outliers. That makes it the best candidate for summarizing with an IQR.
B) The histogram on the left shows a low outlier. The standard deviation is sensitive to outliers, so we'd prefer to use the IQR for this one.
C) The histogram on the right shows a high outlier. The standard deviation is sensitive to outliers, so we'd prefer to use the IQR for this one.
D) The histogram on the left is most strongly skewed to the right. That makes it the best candidate for summarizing with an IQR.
E) The histogram on the left is most nearly symmetric and shows no outliers. That makes it the best candidate for summarizing with an IQR.
Answer: C
Diff: 1   Type: BI
Objective: (3.8) Find Appropriate Measure of centre/Spread

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10) The back-to-back dotplot shows the number of fatalities per year caused by tornadoes in a certain state for two periods: 1950-1974 and 1975-1999. Explain how you would summarize the centre and spread of each of the variables depicted in the dotplots.

Number of Fatalities per Year

Fatalities 1950-1974   Fatalities 1975-1999

```
              •••• │0│ ••••••••••••••
            ••••••• │1│ •••••••
      ••••••••••• │2│ •••
              •••• │3│
                •• │4│ ••
                 • │5│ •
```

A) The distribution of the number of fatalities per year for the period 1950-1974 is unimodal and approximately symmetric. Therefore, we would be satisfied using the mean to summarize the centre and the standard deviation to summarize spread. For the period 1975-1999, the distribution of the number of fatalities per year is also unimodal, but skewed to the right. Therefore, we would prefer to use a median for centre and an IQR to summarize spread.
B) The distribution of the number of fatalities per year for the period 1950-1974 is unimodal, but skewed to the right. Therefore, we would prefer to use a median for centre and an IQR to summarize spread. For the period 1975-1999, the distribution is also unimodal and approximately symmetric. Therefore, we would be satisfied using the mean to summarize the centre and the standard deviation to summarize spread.
C) The distribution of the number of fatalities per year for the period 1950-1974 is bimodal. Therefore, we would prefer to use a median to summarize the centre and an IQR to summarize spread. For the period 1975-1999, the distribution of the number of fatalities per year is also bimodal, but skewed to the left. Therefore, we would prefer to use a mean for centre and a standard deviation to summarize spread.
D) The distribution of the number of fatalities per year for the period 1950-1974 is unimodal and approximately symmetric. Therefore, we would prefer to use the median to summarize the centre and the standard deviation to summarize spread. For the period 1975-1999, the distribution of the number of fatalities per year is also unimodal, but skewed to the right. Therefore, we would prefer to use the mean for centre and an IQR to summarize spread.
E) The distribution of the number of fatalities per year for the period 1950-1974 is unimodal but skewed to the right. Therefore, we would prefer to use a median to summarize the centre and IQR to summarize spread. For the period 1975-1999, the distribution of the number of fatalities per year is also unimodal and skewed to the right. Therefore, we would prefer to use a median for centre and an IQR to summarize spread.
Answer: A
Diff: 1   Type: BI
Objective: (3.8) Find Appropriate Measure of centre/Spread

11) Here are some scores from a recent Mathematics exam: 95.5, 65.9, 93.2, 80.6, 56.8, 50, 86.4, 54.5, 40.9, 77.3, 79.5, 10, 65.9, 70.5, 15, 77.3, 81.8, 12, 50, 79.5, 60.2. Which is a better summary of the scores, the mean or the median? Explain.
A) Mean, because the data is so skewed to the left.
B) Median, because the data is so skewed to the left.
C) Either, because the data is symmetric.
D) Median, because the data is so skewed to the right.
E) Mean, because the data is so skewed to the right.
Answer: B
Diff: 2   Type: BI
Objective: (3.8) Find Appropriate Measure of centre/Spread

12) Here are the weekly winnings for several local poker players: $100, $50, $125, $75, $80, $60, $110, $150, $300, $700, $115, $75, $1000, $5000. Which is a better summary of the scores, the mean or the median? Explain.
A) Mean, because the data is extremely skewed to the left.
B) Median, because the data is extremely skewed to the left.
C) Mean, because the data is extremely skewed to the right.
D) Median, because the data is extremely skewed to the right.
E) Either, because the data is symmetric.
Answer: D
Diff: 2   Type: BI
Objective: (3.8) Find Appropriate Measure of centre/Spread

13) Here are the weekly winnings for several local poker players: $100, $50, $125, $75, $80, $60, $110, $150, $300, $700, $115, $75, $1000, $5000. Which is a better summary of the spread, the standard deviation or the IQR? Explain.
A) SD, because the distribution is symmetric.
B) Either, because the distribution is symmetric.
C) SD, because the distribution is skewed.
D) IQR, because the distribution is symmetric.
E) IQR, because the distribution is skewed.
Answer: E
Diff: 2   Type: BI
Objective: (3.8) Find Appropriate Measure of centre/Spread

14) A clerk entering salary data into a company spreadsheet accidentally omitted a "0" in the CEO's salary, listing it as $155,000 instead of $1,550,000. Explain how this error will affect these summary statistics for the company payroll: a) measures of centre: median and mean; and b) measures of spread: range, IQR, and standard deviation.
Answer:
a) Median will probably be unaffected. The mean will be smaller.
b) The range and standard deviation will decrease; IQR will be unaffected.
Diff: 3   Type: SA
Objective: (3.8) *Know Concepts: Displaying and Summarizing Quantitative Data

15) During student-teacher negotiations at a certain high school, teachers seek to change the number of times students are allowed to be tardy, saying that the semester "average" is 8 days of tardiness per student. The students counter that the "average" student is only tardy 4 times per semester. Explain how both sides may be correct, identifying the measure of centre you think each side is using and why the difference might exist.

Answer: Answers will vary. One possibility is that the teachers are using the mean to measure the centre while the students are using the median. The mean could be higher than the median if the distribution is skewed to the right or if there are any large outliers (one or two students were tardy a very large number of days).

Diff: 3   Type: SA

Objective: (3.8) *Know Concepts: Displaying and Summarizing Quantitative Data

16) A sewing supply company has a database of tens of thousands of products that they sell in their stores. One of the variables in the database, *Thread_Colour*, contains the names of the colors of the various spools of thread that are sold. The most commonly sold are white, black, and brown, but there are also magenta, azure, sea foam green, and nutmeg, to name a few others. In all there are more than 500 different colours, each with a corresponding numeric code. Here are a few of them:

Code	Colour
000	white
001	black
002	brown
003	yellow
004	blue
005	red
009	violet
010	magenta
127	sea foam green
128	nutmeg
134	turquoise
159	evergreen
687	midnight blue
508	teal

An intern who was asked to analyze the company's thread sales presented these summary statistics for the variable *Thread_Colour:*

Mean	35.89
StdDev	784.92
Median	2
IQR	3
n	87602

a) What does the mean of 35.89 mean?
b) What are the typical reasons that cause measures of centre and spread to be as different as those in this table?
c) Is that why these are so different?
Answer:
a) Although numeric codes have been assigned to the different titles, these data are categorical, not quantitative. The mean of 35.89 is meaningless.
b) The typical reasons are skewness and/or outliers.
c) No. Here the numbers are just codes. Most of the colors were probably white, black, or brown, making the "median" 2, but these summary statistics are meaningless.
Diff: 3   Type: SA
Objective: (3.8) *Know Concepts: Displaying and Summarizing Quantitative Data

17) The weekly salaries (in dollars) of 24 randomly selected employees of a company are shown below, and displayed on the following boxplot.

310	320	450	460	470	500	520	540
580	600	650	700	710	840	870	900
1000	1200	1250	1300	1400	1720	2500	3700
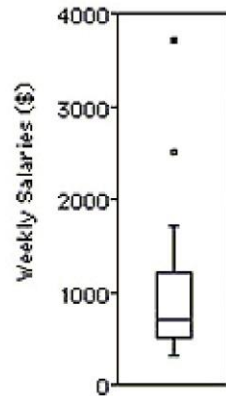
Find the mean and the median. Which is the most appropriate measure of centre?
A) Mean: $979; Median: $705
The median is the most appropriate measure of centre because the outliers are not significant in the distribution.
B) Mean: $942; Median: $700
The median is the most appropriate measure of centre because of the outliers.
C) Mean: $979; Median: $705
The mean is the most appropriate measure of centre because the outliers are not significant in the distribution.
D) Mean: $979; Median: $705
The median is the most appropriate measure of centre because of the outliers.
E) Mean: $979; Median: $705
The mean is the most appropriate measure of centre because of the outliers.
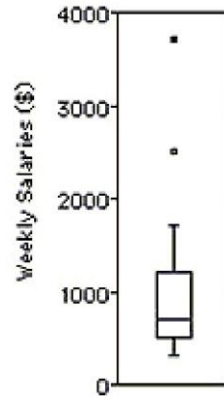Answer: D
Diff: 1   Type: BI
Objective: (3.8) Find Appropriate Measure of centre/Spread

18) The weekly salaries (in dollars) of 24 randomly selected employees of a company are shown below, and displayed on the following boxplot.

310	320	450	460	470	500	520	540
580	600	650	700	710	840	870	900
1000	1200	1250	1300	1400	1720	2500	3700

Find the IQR and the standard deviation. Which is the most appropriate measure of spread?
A) IQR: $789.3; standard deviation: $740
The IQR is the most appropriate measure of centre because of the outliers.
B) IQR: $715; standard deviation: $769
The standard deviation is the most appropriate measure of centre because of the outliers.
C) IQR: $715; standard deviation: $769
The standard deviation is the most appropriate measure of centre because the outliers are not significant in the distribution.
D) IQR: $715; standard deviation: $769
The IQR is the most appropriate measure of centre because the outliers are not significant in the distribution.
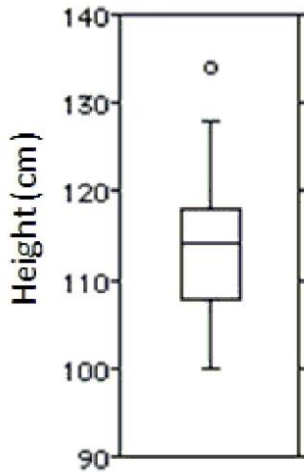E) IQR: $715; standard deviation: $769
The IQR is the most appropriate measure of centre because of the outliers.
Answer: E
Diff: 1   Type: BI
Objective: (3.8) Find Appropriate Measure of centre/Spread

19) Shown below are the boxplot and summary statistics for the heights, in centimetres, of a class of Grade 3 students in Halifax, NS.

Count	32
Mean	114.2
Median	114.5
StdDev	7.7
Min	100
Max	134
Q1	107.5
Q3	118

Which measures of centre and spread would you use for this distribution?
A) Median and standard deviation because the outlier affects the mean.
B) Mean and standard deviation because the outlier affects the mean.
C) Mean and IQR because the outlier does not really affect the mean.
D) Median and IQR because the outlier significantly affects the mean.
E) Mean and standard deviation because the outlier does not really affect the mean.
Answer: E
Diff: 1   Type: BI
Objective: (3.8) Find Appropriate Measure of centre/Spread

20) Shown below are the boxplot and the histogram for the weekly salaries (in dollars) of 24 randomly selected employees of a company:
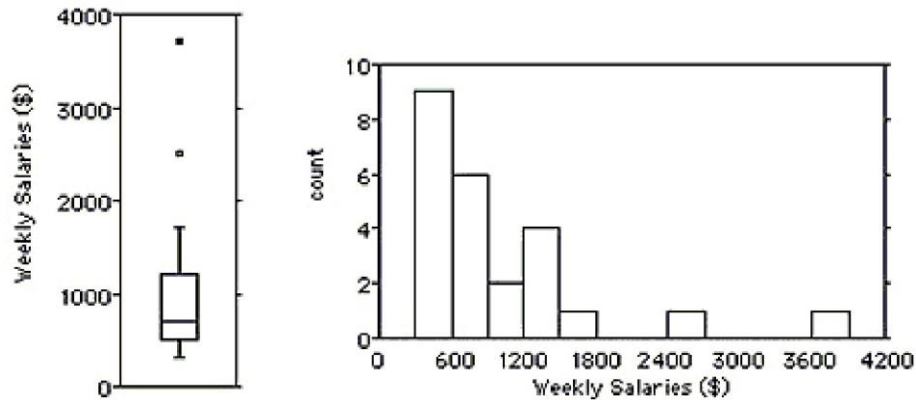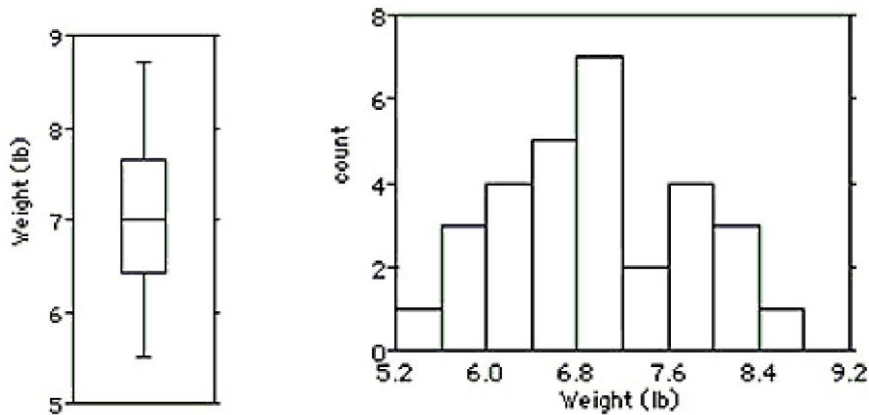

i)   What features of the distribution can you see in both the histogram and the boxplot?
ii) What features of the distribution can you see in the boxplot that you could not see in the histogram?
A) i) The distribution is unimodal and skewed to the right, with two outliers at $2500 and about $3700. The mean is greater than the median because of the skewedness.
ii) You can more easily tell from the boxplot that the median is about $700 with quartiles at about $500 and $1200.
B) i) The distribution is symmetrical, with two outliers at $2900 and about $3000. The mean and median are about the same.
ii) You can more easily tell from the boxplot that the mean is about $500 with quartiles at about $700 and $1800.
C) i) The distribution is unimodal and skewed to the left, with two outliers at $2500 and about $3700. The mean is lower than the median because of the skewedness.
ii) You can more easily tell from the boxplot that the median is about $900 with quartiles at about $1100 and $1600.
D) i) The distribution is unimodal and skewed to the right, with two outliers at $2900 and about $3000. The mean is greater than the median because of the skewedness.
ii) You can more easily tell from the boxplot that the median is about $700 with quartiles at about $500 and $1200.
E) i) The distribution is symmetrical, with two outliers at $2500 and about $3700. The mean and median are about the same.
ii) You can more easily tell from the boxplot that the mean is about $700 with quartiles at about $500 and $1200.
Answer: A
Diff: 1   Type: BI
Objective: (3.8) Compare Features of Histogram and Boxplot

21) Shown below are the boxplot and the histogram for the weights (in pounds) of 30 newborn babies in Edmonton, Alberta in May, 2014.
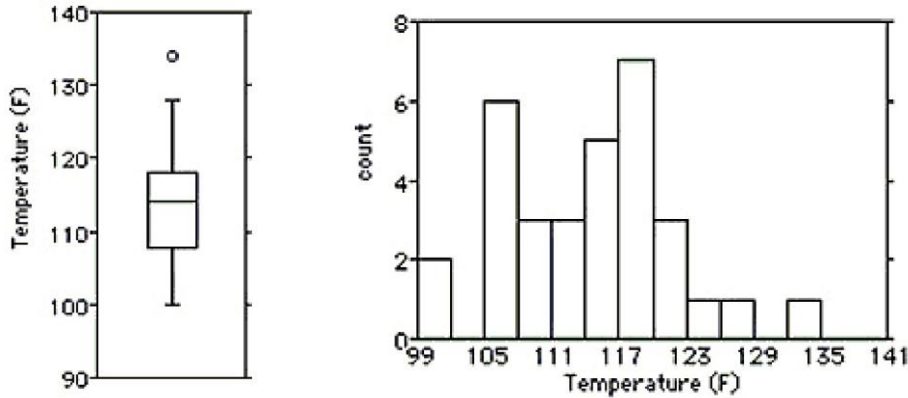

i)   What features of the distribution can you see in both the histogram and the boxplot?
ii)   What features of the distribution can you see in the histogram that you could not see in the boxplot?
A) i) The distribution is bimodal and symmetric. There are two outliers at about 5.4 and 8.6. The mean and median values are about the same.
ii) The dip at about 7.4 lb, for example, is apparent only from the histogram.
B) i) The distribution is unimodal and skewed to the right. There are no outliers. The mean is greater than the median.
ii) The dip at about 7.4 lb, for example, is apparent only from the histogram.
C) i) The distribution is unimodal and symmetric. There are two outliers at about 5.4 and 8.6. The mean and median values are about the same.
ii) The dip at about 7.4 lb, for example, is apparent only from the histogram.
D) i) The distribution is unimodal and skewed to the left. There are no outliers. The mean is less than the median.
ii) The dip at about 7.4 lb, for example, is apparent only from the histogram.
E) i) The distribution is unimodal and symmetric. There are no outliers. The mean and median values are about the same.
ii) The dip at about 7.4 lb, for example, is apparent only from the histogram.
Answer: E
Diff: 1   Type: BI
Objective: (3.8) Compare Features of Histogram and Boxplot

22) Shown below are the boxplot and the histogram for the highest temperatures ever recorded (in °F) in 32 different states in the U.S.A.

i)   What features of the distribution can you see in both the histogram and the boxplot?
ii)   What features of the distribution can you see in the histogram that you could not see in the boxplot?
A) i) The distribution is highly skewed to the right, with two outliers at 128°F and 134°F. Most high temperatures are between 105°F and 129°F.
ii) When looking at the histogram, the distribution appears to be bimodal. This is not obvious from the boxplot.
B) i) The distribution is highly skewed to the left, with an outlier at 134°F. Most high temperatures are between 108°F and 130°F.
ii) When looking at the histogram, the distribution appears to be bimodal. This is not obvious from the boxplot.
C) i) The distribution is fairly symmetric, with no outliers. Most high temperatures are between 99°F and 117°F.
ii) When looking at the histogram, the distribution appears to be bimodal. This is not obvious from the boxplot.
D) i) The distribution is highly skewed to the right, with an outlier at 134°F. Most high temperatures are between 105°F and 129°F.
ii) When looking at the histogram, the distribution appears to be bimodal. This is not obvious from the boxplot.
E) i) The distribution is fairly symmetric, with an outlier at 134°F (although this value is only obvious from the boxplot). Most high temperatures are between 107°F and 118°F.
ii) When looking at the histogram, the distribution appears to be bimodal. This is not obvious from the boxplot.
Answer: E
Diff: 1   Type: BI
Objective: (3.8) Compare Features of Histogram and Boxplot

23) Here is the stem-and-leaf display of the midterm test scores for the seventh-period mathematics class. Describe the distribution (shape, centre, spread, unusual features).

Midterm Test Scores
```
10 | 0
 9 | 1 1
 8 | 0 0 0 1 1 2 3 5 5 6 6 7 8
 7 | 5 5 5 8 8 9
 6 | 4 7 7 8
 5 | 3 9
 4 |
 3 | 3
 2 | 9
 1 |
 0 |
```

Key:
7 | 5 = 75 points

A) The distribution of the midterm test scores is unimodal and skewed to the left. The median is 80 with an IQR of 17 (Q1 is 68 and Q3 is 85). The first score is an outlier.
B) The distribution of the midterm test scores is unimodal and skewed to the left. The median is 80 with an IQR of 17 (Q1 is 68 and Q3 is 85). The first two scores are outliers.
C) The distribution of the midterm test scores is unimodal and skewed to the left. The median is 79 with an IQR of 17 (Q1 is 68 and Q3 is 85). The first two scores are outliers.
D) The distribution of the midterm test scores is unimodal and skewed to the left. The median is 80 with an IQR of 17 (Q1 is 68 and Q3 is 85). There are no outliers.
E) The distribution of the midterm test scores is unimodal and skewed to the right. The median is 80 with an IQR of 17 (Q1 is 68 and Q3 is 85). The first two scores are outliers.
Answer: B
Diff: 1   Type: BI
Objective: (3.8) Describe Situation Given Stemplot or Dotplot

Use summary statistics to answer the question.

24) Here are the summary statistics for the monthly payroll for an accounting firm:

lowest salary = $15,000
mean salary = $35,000
median = $25,000
range = $60,000
IQR = $30,000
first quartile = $17,500
standard deviation = $20,000

Do you think the distribution of salaries is symmetric, skewed to the left, or skewed to the right? Explain why.
A) Skewed to the left; mean is lower than median.
B) Skewed to the right; mean is higher than median.
C) Symmetric; mean is higher than median.
D) Skewed to the left; mean is higher than median.
E) Skewed to the right; mean is lower than median.
Answer: B
Diff: 1   Type: BI
Objective: (3.8) Describe Distribution of Quantitative Variable

25) A local ice cream shop hand scoops each of its ice cream cones. The cones vary in weight from 120 grams to 216 grams with a mean of 181 grams and a standard deviation of 34 grams. The quartiles and median weights are 146, 244, and 202 grams.

Is the distribution symmetric, skewed to the left, or skewed to the right? Explain.
A) Skewed to the left; mean higher than median.
B) Skewed to the right; mean higher than median.
C) Symmetric; mean lower than median.
D) Skewed to the right; mean lower than median.
E) Skewed to the left; mean lower than median.
Answer: E
Diff: 1   Type: BI
Objective: (3.8) Describe Distribution of Quantitative Variable

26) Here are some summary statistics for all of the runners in a local 12 kilometre race:

slowest time = 124 minutes
mean = 85 minutes
median = 85 minutes
range = 94 minutes
IQR = 56
Q1 = 34
standard deviation = 13 minutes

Is the distribution symmetric, skewed to the left, or skewed to the right? Explain.
A) Skewed to the right; mean higher than median.
B) Symmetric; mean same as median.
C) Skewed to the right; mean lower than median.
D) Skewed to the left; mean higher than median.
E) Skewed to the left; mean lower than median.
Answer: B
Diff: 1   Type: BI
Objective: (3.8) Describe Distribution of Quantitative Variable

27) Here are some statistics for the annual Wildcat golf tournament: lowest score = 56, mean score = 90, median = 98, range = 94, IQR = 106, Q1 = 36, standard deviation = 11. Is the distribution symmetric, skewed to the left, or skewed to the right? Explain.
A) Skewed to the left; mean higher than median.
B) Skewed to the left; mean lower than median.
C) Symmetric; mean lower than median.
D) Skewed to the right; mean higher than median.
E) Skewed to the right; mean lower than median.
Answer: B
Diff: 1   Type: BI
Objective: (3.8) Describe Distribution of Quantitative Variable

28) Here are some summary statistics for the recent English exam: lowest score = 36, mean score = 71, median = 85.2, range = 74, IQR = 61, Q1 = 28, standard deviation = 8.3. Is the distribution symmetric, skewed to the left, or skewed to the right? Explain.
A) Skewed to the right; mean higher than median.
B) Symmetric; mean lower than median.
C) Skewed to the left; mean lower than median.
D) Skewed to the right; mean lower than median.
E) Skewed to the left; mean higher than median.
Answer: C
Diff: 1   Type: BI
Objective: (3.8) Describe Distribution of Quantitative Variable

29) Here are some summary statistics for annual snowfall in a certain town compiled over the last 15 years: lowest amount = 19 cm, mean = 40 cm, median = 33 cm, range = 81 cm, IQR = 45 cm, Q1 = 16 cm, standard deviation = 11 cm. Is the distribution symmetric, skewed to the left, or skewed to the right? Explain.
A) Skewed to the left; mean higher than median.
B) Skewed to the right; mean higher than median.
C) Skewed to the left; mean lower than median.
D) Skewed to the right; mean lower than median.
E) Symmetric; mean higher than median.
Answer: B
Diff: 1   Type: BI
Objective: (3.8) Describe Distribution of Quantitative Variable

30) Here are some summary statistics for last year's basketball team scoring output: lowest score = 19 points, mean = 55 points, median = 49 points, range = 96 points, IQR = 52, Q1 = 22, standard deviation = 6 points. Is the distribution symmetric, skewed to the left, or skewed to the right? Explain.
A) Symmetric; mean higher than median.
B) Skewed to the left; mean higher than median.
C) Skewed to the right; mean higher than median.
D) Skewed to the right; mean lower than median.
E) Skewed to the left; mean lower than median.
Answer: C
Diff: 1   Type: BI
Objective: (3.8) Describe Distribution of Quantitative Variable

31) The speed vehicles travelled on a local road was recorded for one month. The speeds ranged from 50 km/h to 65 km/h with a mean speed of 55 km/h and a standard deviation of 7 km/h. The quartiles and median speeds were 53 km/h, 62 km/h, and 52 km/h. Is the distribution symmetric, skewed to the left, or skewed to the right? Explain.
A) Skewed to the right; mean lower than median.
B) Skewed to the right; mean higher than median.
C) Skewed to the left; mean higher than median.
D) Skewed to the left; mean lower than median.
E) Symmetric; mean higher than median.
Answer: B
Diff: 1   Type: BI
Objective: (3.8) Describe Distribution of Quantitative Variable

32) Here are some summary statistics for the size of forest fires last year: smallest fire = 74 acres, mean = 451 acres, median = 451 acres, range = 7926 acres, IQR = 387, Q1 = 180, standard deviation = 61 acres. Is the distribution symmetric, skewed to the left, or skewed to the right? Explain.
A) Skewed to the right; mean higher than median.
B) Symmetric; mean same as median.
C) Skewed to the left; mean higher than median.
D) Skewed to the right; mean lower than median.
E) Skewed to the left; mean lower than median.
Answer: B
Diff: 1   Type: BI
Objective: (3.8) Describe Distribution of Quantitative Variable

33) The free throw percentages for the participants in a basketball tournament were compiled. The percents ranged from 33% to 99% with a mean of 56% and a standard deviation of 7%. The quartiles and median percentages were 43%, 87%, and 56%. Is the distribution symmetric, skewed to the left, or skewed to the right? Explain.
A) Skewed to the left; mean higher than median.
B) Skewed to the right; mean higher than median.
C) Skewed to the left; mean lower than median.
D) Skewed to the right; mean lower than median.
E) Symmetric; mean same as median.
Answer: E
Diff: 1   Type: BI
Objective: (3.8) Describe Distribution of Quantitative Variable

34) A local ice cream shop hand scoops each of its ice cream cones. The cones vary in weight from 126 grams to 291 grams with a mean of 181 grams and a standard deviation of 34 grams. The quartiles and median weights are 157, 255, and 202 ounces. A customer makes a special order of a 448 ounce cone.

Which of the summary statistics might not change if that data value was added to the distribution?
A) Median, range
B) Range, SD
C) Q1, Q3
D) Mean, IQR
E) Median, IQR
Answer: E
Diff: 2   Type: BI
Objective: (3.8) Describe Distribution of Quantitative Variable

35) The speed vehicles travelled on a local road was recorded for one month. The speeds ranged from 52 km/h to 67 km/h with a mean speed of 56 km/h and a standard deviation of 7 km/h. The quartiles and median speeds were 55 km/h, 64 km/h, and 53 km/h. Suppose during the month, one driver was clocked at 25 km/h.

Which of the summary statistics might not change if that data value was added to the distribution?
A) Q1, Q3
B) Median, range
C) Median, IQR
D) Mean, IQR
E) Range, SD
Answer: C
Diff: 2   Type: BI
Objective: (3.8) Describe Distribution of Quantitative Variable

36) The free throw percentages for participants in a basketball tournament were compiled. The percents ranged from 31% to 91% with a mean of 63% and a standard deviation of 6%. The quartiles and median percentages were 41%, 79%, and 63%. Suppose one participant did not make any of his attempted free throws (0%). Which of the summary statistics might not change if that data value was added to the distribution?
A) Median, range
B) Q1, Q3
C) Range, SD
D) Mean, IQR
E) Median, IQR
Answer: E
Diff: 2   Type: BI
Objective: (3.8) Describe Distribution of Quantitative Variable

37) Shown below are the data and summary statistics for the reading scores of 29 fifth graders.

1.3 1.5 2.1 2.5 2.7 3.1 3.4 3.6
3.7 3.8 4.1 4.2 4.3 4.5 4.6 4.7
4.7 4.8 4.8 5.1 5.1 5.2 5.3 5.4
5.4 5.6 5.6 5.8 5.9

Count	Mean	Median	StdDev	Min	Max	Q1	Q3
29	4.2	4.6	1.3	1.3	5.9	3.50	5.25

Write a brief summary of the performance of the fifth graders.
A) The distribution is unimodal and skewed to the left. The median is 4.6, while the mean is 4.2, lower than the median score. The middle 50% of the weekly salaries are between 3.50 and 5.25, for an IQR of 1.75. There are no outliers.
B) The distribution is unimodal and skewed to the right. The median is 4.6, while the mean is 4.2, lower than the median score. The middle 50% of the weekly salaries are between 3.50 and 5.25, for an IQR of 1.75. There are no outliers.
C) The distribution is unimodal and skewed to the left. The median is 4.6, while the mean is 4.2, lower than the median score. The middle 50% of the weekly salaries are between 3.50 and 5.25, for an IQR of 1.75. The score of 1.3 is an outlier.
D) The distribution is skewed to the right. The median is 4.2, while the mean is 4.6, higher than the median score. The middle 50% of the weekly salaries are between 3.6 and 5.2, for an IQR of 1.6. There are no outliers.
E) The distribution is unimodal and skewed to the left. The median is 4.6, while the mean is 4.2, lower than the median score. The middle 50% of the weekly salaries are between 3.6 and 5.2, for an IQR of 1.6. There are no outliers.
Answer: A
Diff: 2   Type: BI
Objective: (3.8) Describe Distribution of Quantitative Variable

38) Here are summary statistics for the time, in minutes, it took 21 students to write a statistics test.

Count	Mean	Median	StdDev	Min	Max	Q1	Q3
21	23.9	22.0	12.2	5.1	51.7	15.4	33.4

Would you describe this distribution as symmetric or skewed?
A) Skewed to the right, because the mean is much larger than the median and the upper quartile is farther from the median than the lower quartile.
B) Symmetric, because the mean and the median are close.
C) Skewed to the right, because the mean is much larger than the median and the lower quartile is farther from the median than the upper quartile.
D) Skewed to the left, because the mean is much larger than the median and the lower quartile is farther from the median than the upper quartile.
E) Skewed to the left, because the mean is much larger than the median and the upper quartile is farther from the median than the lower quartile.
Answer: A
Diff: 1   Type: BI
Objective: (3.8) Describe Distribution of Quantitative Variable

39) Here are summary statistics for the time, in minutes, it took for 20 people to complete an information survey at a walk-in medical clinic.

Count	Mean	Median	StdDev	Min	Max	Q1	Q3
20	3.23	3.45	1.2	0.4	7.0	2.1	3.8

Would you describe this distribution as symmetric or skewed?
A) Skewed to the left, because the mean is smaller than the median and the upper quartile is farther from the median than the lower quartile.
B) Skewed to the right, because the mean is smaller than the median and the lower quartile is farther from the median than the upper quartile.
C) Symmetric, because the mean and the median are close.
D) Skewed to the right, because the mean is larger than the median and the upper quartile is farther from the median than the lower quartile.
E) Skewed to the left, because the mean is smaller than the median and the lower quartile is farther from the median than the upper quartile.
Answer: E
Diff: 2   Type: BI
Objective: (3.8) Describe Distribution of Quantitative Variable

40) Here are summary statistics for the time, in minutes, it took for 20 people to complete an information survey at a walk-in medical clinic.

Count	Mean	Median	StdDev	Min	Max	Q1	Q3
20	3.23	3.45	1.2	0.4	7.0	2.1	3.8

Write a few sentences about the amount of time these people took to complete the information survey.
A) The 20 times range in length between 0.4 and 7 minutes. The median time is 3.45 minutes, so half are longer and half are shorter. The middle 50% of these times range between 2.1 and 3.8 minutes. The distribution is skewed to the right, with at least the outlier 0.4 minutes.
B) The 20 times range in length between 0.4 and 7 minutes. The median time is 3.23 minutes, so half are longer and half are shorter. The middle 50% of these times range between 2.1 and 3.45 minutes. The distribution is skewed to the right, with at least the outlier 7 minutes.
C) The 20 times range in length between 0.4 and 7 minutes. The median time is 3.45 minutes, so half are longer and half are shorter. The middle 50% of these times range between 2.1 and 3.8 minutes. The distribution is skewed to the right, with no outliers.
D) The 20 times range in length between 0.4 and 7 minutes. The median time is 3.45 minutes, so half are longer and half are shorter. The middle 50% of these times range between 0.4 and 3.8 minutes. The distribution is skewed to the left, with at least the outlier 0.4 minutes.
E) The 20 times range in length between 0.4 and 7 minutes. The median time is 3.45 minutes, so half are longer and half are shorter. The middle 50% of these times range between 2.1 and 3.8 minutes. The distribution is skewed to the left, with at least the outlier 7 minutes.
Answer: E
Diff: 2   Type: BI
Objective: (3.8) Describe Distribution of Quantitative Variable

41) Shown below are the boxplot, the histogram and summary statistics for the highest temperatures ever recorded (in °F) in 32 different states in the U.S.A..
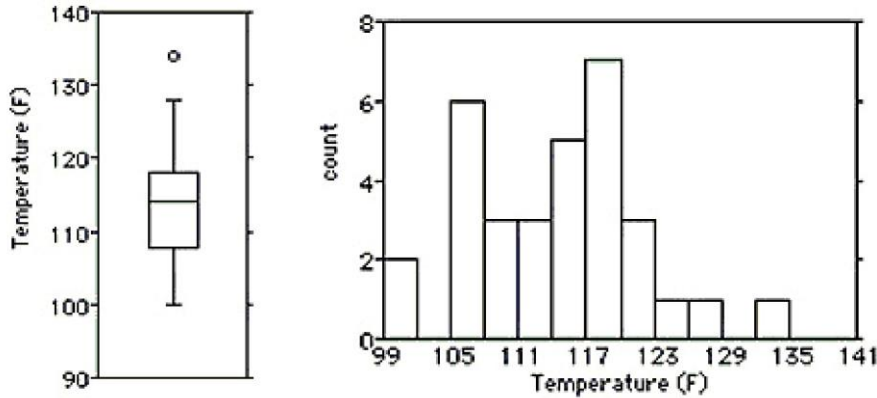
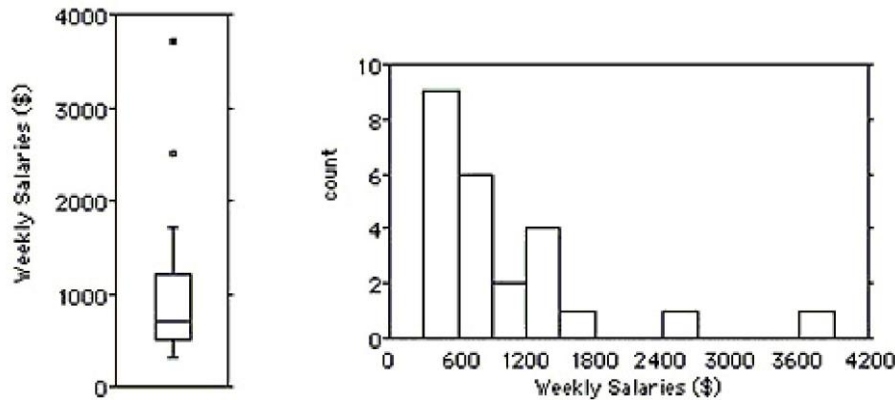| Count	Mean	Median	StdDev	Min	Max	Q1	Q3
32	114.2	114.5	7.7	100	134	107.5	118

Write a few sentences describing the distribution.
A) The distribution is bimodal, symmetric with a mean of 114.2°F. There is a high outlier that should be investigated. The standard deviation is 7.7°F. The boxplot shows that half of the time, the highest temperatures were between about 107.5°F and 114°F.
B) The distribution is unimodal, symmetric enough with a mean of 114.2°F. There is a high outlier that should be investigated, but it does not influence the mean very much. The standard deviation is 7.7°F. The boxplot shows that half of the time, the highest temperatures were between about 107.5°F and 118°F.
C) The distribution is bimodal, essentially symmetric with a mean of 114.2°F. There is a high outlier that should be investigated, but it does not influence the mean very much. The standard deviation is 7.7°F. The boxplot shows that half of the time, the highest temperature were between about 107.5°F and 118°F.
D) The distribution is unimodal, essentially symmetric with a mean of 114.2°F. There is a high outlier that should be investigated, because it influences the mean. The standard deviation is 7.7°F. The boxplot shows that half of the time, the highest temperatures were between about 107.5°F and 114°F.
E) The distribution is unimodal, essentially symmetric with a mean of 114.2°F. There is a high outlier that should be investigated, but it does not influence the mean very much. The standard deviation is 7.7°F. The boxplot shows that half of the time, the highest temperatures were between about 107.5°F and 114°F.
Answer: C
Diff: 2   Type: BI
Objective: (3.8) Describe Distribution of Quantitative Variable

42) Shown below are the boxplot, the histogram and summary statistics for the weekly salaries (in dollars) of 24 randomly selected employees of a company:

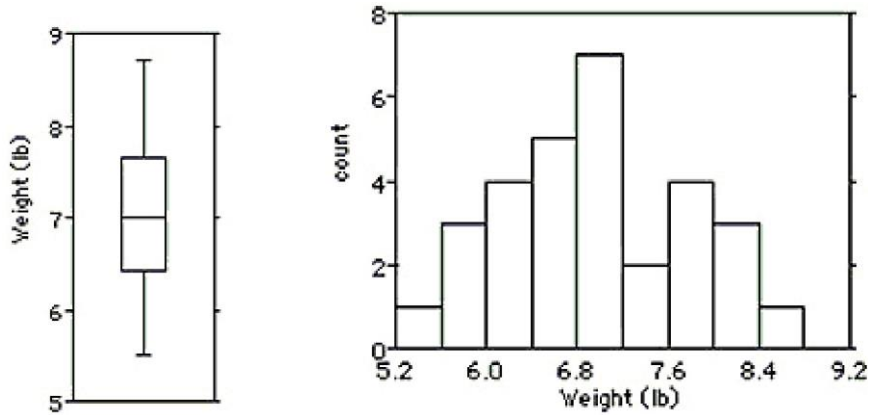| Count	Mean	Median	StdDev	Min	Max	Q1	Q3
24	978.8	705	765.7	310	3700	510	1225

Write a few sentences describing the distribution.
A) The distribution is unimodal and skewed to the right. As shown in the boxplot, there are two outliers, weekly salaries of $2500 and about $3700. The median was 978.8, while the mean was 705, above the median score. The middle 50% of the weekly salaries were between $510 and $1225 for an IQR of $715.
B) The distribution is bimodal and skewed to the right. As shown in the boxplot, there are two outliers, weekly salaries of $2500 and about $3700. The median was 705, while the mean was 978.8, above the median score. The middle 50% of the weekly salaries were between $705 and $1225 for an IQR of $520.
C) The distribution is unimodal and skewed to the left. As shown in the boxplot, there are two outliers, weekly salaries of $2500 and about $3700. The median was 705, while the mean was 978.8, above the median score. The middle 50% of the weekly salaries were between $705 and $1225 for an IQR of $520.
D) The distribution is unimodal and skewed to the right. As shown in the boxplot, there are two outliers, weekly salaries of $2500 and about $3700. The median was 705, while the mean was 978.8, above the median score. The middle 50% of the weekly salaries were between $510 and $1225 for an IQR of $715.
E) The distribution is unimodal and skewed to the left. As shown in the boxplot, there are two outliers, weekly salaries of $2500 and about $3700. The median was 705, while the mean was 978.8, above the median score. The middle 50% of the weekly salaries were between $510 and $1225 for an IQR of $715.
Answer: D
Diff: 2   Type: BI
Objective: (3.8) Describe Distribution of Quantitative Variable

43) Shown below are the boxplot, the histogram and summary statistics for the weights (in pounds) of 30 newborn babies:

| Count	Mean	Median	StdDev	Min	Max	Q1	Q3
30	6.9	7.0	0.8	5.5	8.7	6.4	7.7

Write a few sentences describing the distribution.
A) The distribution is unimodal and symmetric. There are no outliers. The mean newborn baby weight was 6.9 lb with a standard deviation of 0.8 lb.
B) The distribution is unimodal and symmetric. There are no outliers. The mean newborn baby weight was 7 lb with a standard deviation of 1.3 lb.
C) The distribution is unimodal and skewed to the right. There are no outliers. The mean newborn baby weight was 7 lb with an IQR of 1.3 lb.
D) The distribution is bimodal and symmetric. There are no outliers. The mean newborn baby weight was 6.9 lb with a standard deviation of 0.8 lb.
E) The distribution is unimodal and skewed to the left. There are no outliers. The mean newborn baby weight was 7 lb with an IQR of 1.3 lb.
Answer: A
Diff: 2   Type: BI
Objective: (3.8) Describe Distribution of Quantitative Variable

44) Here is the boxplot and an ogive of the distribution of students marks on their statistics test.
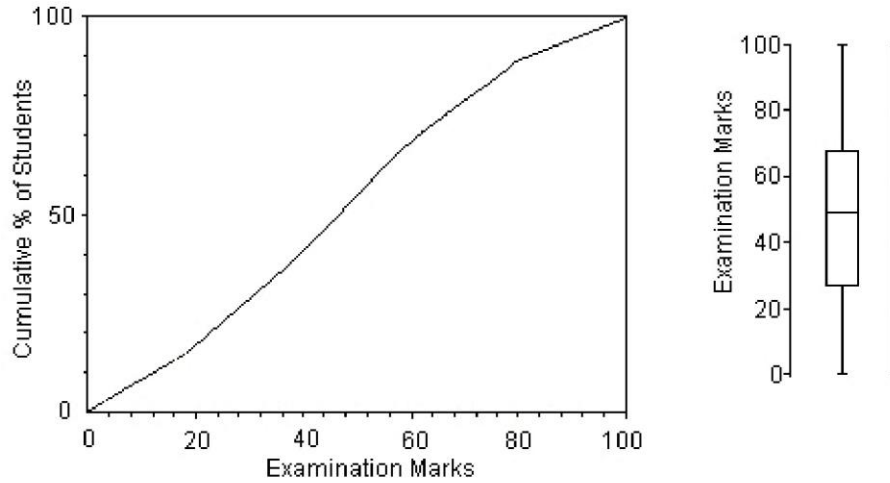
Write a few sentences describing this distribution.
A) The distribution of the marks is slightly skewed to the left. The median mark was about 48, with a max of 100 and a min of 0. The middle 50% of the marks appeared to range from 18 to 75, for an IQR of 57. 55% of the students had a mark less than 50.
B) The distribution of the marks is slightly skewed to the left. The median mark was about 48, with a max of 100 and a min of 0. The middle 50% of the marks appeared to range from 26 to 66, for an IQR of 40. About 55% of the students had a mark less than 50.
C) The distribution of the marks is slightly skewed to the right. The median mark was about 48, with a max of 100 and a min of 0. The middle 50% of the marks appeared to range from 26 to 66, for an IQR of 40. About 55% of the students had a mark greater than 50.
D) The distribution of the marks is slightly skewed to the left. The median mark was about 48, with a max of 100 and a min of 0. The middle 50% of the marks appeared to range from 26 to 66, for an IQR of 40. About 55% of the students had a mark greater than 50.
E) The distribution of the marks is slightly skewed to the right. The median mark was about 55, with a max of 100 and a min of 0. The middle 50% of the marks appeared to range from 26 to 66, for an IQR of 40. About 55% of the students had a mark less than 50.
Answer: B
Diff: 2   Type: BI
Objective: (3.8) Describe Distribution of Quantitative Variable

45) A medical study of the effects of on Drug X asked adult volunteers to take a heart-rate test one hour after taking Drug X. Some took a placebo (a pill containing no active ingredients), some were given a regular dose of Drug X, and others were given half a regular dose of Drug X. Here are the 5-number summaries for each group's scores on the test (# of beats that the heart rate increased when timed for 60 seconds):

	n	Min	Q1	Median	Q3	Max
Placebo	13	0	1	2	3	5
Half Dose	13	1	2	3	5	8
Reg. Dose	13	1	2	3	7	9

a) Describe the W's for these data.
b) Name the variables and classify each as categorical or quantitative.
c) Write a few sentences comparing the results of the three groups (create parallel boxplots to help you, if necessary.)
Answer:
a) *Who:* Adult volunteers
    What: Heart-rate test
    Where, when: Not specified
    How: Volunteers took a heart-rate test one hour after taking either a placebo, a half-dose, or a regular dose of Drug X.
    Why: To see if Drug X increases your heart rate.
b) Dose: categorical; Test score: quantitative
c) The volunteers' heart-rate test scores were about the same whether they took a half-dose or a regular dose of Drug X. The medians for both were 3 additional beats, with slightly more variation for the regular dosage group. The placebo group generally "scored" lower than the other two groups on all measures of the 5-number summary but it is not clear if the differences are significant.
Diff: 2   Type: SA
Objective: (3.8) Describe Distribution of Quantitative Variable

46) A class of sixth graders takes a diagnostic reading test, and the scores are reported by reading grade level. The 5-number summaries for the 20 boys and 21 girls are shown:

Boys: 4.7   5.9   6.4   7.6   7.8
Girls: 4.1   5.8   6.4   6.8   8.0

a) Which group had the highest score?
b) Which group had the greatest range?
c) Which group had the greatest interquartile range?
d) Which group's scores appear to be more skewed? Explain.
e) Which group generally did better on the test? Explain.
f) If the mean reading level for boys was 6.6 and for girls was 6.4, what is the overall mean for the class?
Answer:
a) Girls
b) Girls
c) Boys
d) The boys appear to have more skew, as their scores were less symmetric between quartiles. The girls' quartiles are almost the same distance from the median.
e) Boys. Even though their median score was the same as the girls', their upper and lower quartiles are larger.
f) [20 (6.6) + 21(6.4)]/41 = 6.50
Diff: 2   Type: SA
Objective: (3.8) Describe Distribution of Quantitative Variable