MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

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.
   - 12, 14, 20, 12, 16
   - A) 14 shrimp
   - B) 14.8 shrimp
   - C) 16 shrimp
   - D) 18.5 shrimp
   - E) 12 shrimp

2. The students in Hugh Logan’s math class took the Scholastic Aptitude Test. Their math scores are shown below.
   - 537 594 346 344 612
   - 347 343 647 470 482
   - A) 472.2
   - B) 476.0
   - C) 647.1
   - D) 462.9
   - E) 481.8

3. Last year, nine employees of an electronics company retired. Their ages at retirement, in years, are listed below.
   - 57 66 64
   - 52 65 58
   - 59 55 53
   - Round your answer to the nearest tenth.
   - A) 58.1 years old
   - B) 61.0 years old
   - C) 57.5 years old
   - D) 58.8 years old
   - E) 55.5 years old

4. Here are the grocery bills, in dollars, for six shoppers.
   - $69.16 $85.39 $64.28 $76.06 $47.66 $48.00
   - Round your answer to the nearest cent.
   - A) $78.11
   - B) $97.64
   - C) $65.09
   - D) $76.06
   - E) $66.11
5. Some college friends went shopping for their textbooks. Here are the amounts that they spent, in dollars.

$123.02 $137.70 $173.57 $157.31 $284.94 $217.87

Round your answer to the nearest cent.
A) $137.70  B) $218.88  C) $206.88  D) $273.60  E) $182.40

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

$536.11 $414.53 $417.43 $378.88 $360.69 $486.37

Round your answer to the nearest cent.
A) $648.50  B) $432.34  C) $486.37  D) $518.80  E) $506.80

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.

$196.83 $404.99 $424.17 $421.25 $457.49
$187.35 $419.49 $236.61 $176.25

Round your answer to the nearest cent.
A) $365.55  B) $324.94  C) $417.78  D) $421.25  E) $318.27

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

$1815.75 $2968.81 $3101.58
$2319.92 $1991.23 $4904.98
$1123.53 $4442.19 $3273.83
$3698.55

Round your answer to the nearest cent.
A) $3293.37  B) $2319.92  C) $2964.04  D) $2958.04  E) $3705.05

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

6.6 6.9 6.6 6.5 8.3 6.6
6.6 6.6 7.4 6.6 6.5 7.2
7.1 6.9 6.9 7.1 8.3 6.6

Round your answer to the nearest tenth.
A) 6.6 hours  B) 7.4 hours  C) 7.0 hours  D) 9.3 hours  E) 7.2 hours

10. A small company employs a supervisor at $1200 a week, an inventory manager at $600 a week, 8 stock boys at $400 a week each, and 6 drivers at $500 a week each.

A) $400  B) $500  C) $1404  D) $450  E) $667
Find the median of the data.

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

6 9 13 21 30 30 49
A) 21 games  
B) 25.5 games  
C) 30 games  
D) 24 games  
E) 13 games

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

130,000 119,000 163,000 213,000 244,000
144,000 140,000 754,000 201,000 166,000
A) $164,500  B) $163,000  C) $166,000  D) $252,000  E) $227,000

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

8234 1020 1336 8010 6760
3595 3536 7446 5313 4167
A) $4941.70  B) $5490.78  C) $4167.00  D) $4740.00  E) $5313.00

14. A substitute teacher traveled the following distances, in miles, to arrive at work.

11 12 32 42 70 75 89
A) 89 mi  B) 70 mi  C) 47 mi  D) 42 mi  E) 32 mi

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

56 54 205 147 277 245 234
A) 277 newspapers  
B) 147 newspapers  
C) 205 newspapers  
D) 175 newspapers  
E) 234 newspapers

16. The number of cars passing through a bank drive-up line during each 15-minute period was recorded. The results are shown below.

29 31 29 32
32 29 34 31
39 35 35 33
28 35 29 24
19 31 31 31
A) 35 cars  B) 29 cars  C) 30.85 cars  D) 31 cars  E) 32 cars
17. Here are the weights, in ounces, of several snack crackers.

0.68  1.25  0.87  1.62  0.89  0.68  1.14  
1.25  1.53  0.97  1.34  1.39  0.72  
0.47  1.34  0.68  1.39  1.72  0.89  0.56

A) 0.72 oz  B) 0.97 oz  C) 0.84 oz  D) 1.25 oz  E) 1.34 oz

18. The precipitation, in inches, for August is given for 20 different cities.

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

A) 3.50 in.  B) 3.05 in.  C) 3.45 in.  D) 3.40 in.  E) 2.94 in.

19. The stem-and-leaf display shows the results of the mathematic test of 30 students.

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

A) 81.5  B) 79  C) 87.5  D) 80.5  E) 86.5

20. A small company employs a supervisor at $1100 a week, an inventory manager at $700 a week, 5 stock boys at $400 a week each, and 3 drivers at $600 a week each.

A) $700  B) $500  C) $400  D) $560  E) $600

Solve the problem.

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

44 46 52 57 60  
63 65 71 74 80  
85 87 90 94 95  

A) 85  B) 86  C) 58.5  D) 60  E) 57

22. 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 72 77 80 81  
85 91 94 96  

A) 81.0  B) 65.0  C) 80.5  D) 80.0  E) 55.5
23. The test scores of 19 students are listed below. Find the interquartile range (IQR) by hand.

91  49  86  68  61
64  97  55  90  76
82  83  53  88  75
43  92  94  66

A) 25  B) 29.5  C) 26.5  D) 29  E) 28.5

24. 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) 33  C) (66, 99)  D) 44  E) 45

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

$690  $587  $813  $642
$728  $560  $484  $610
$518  $676  $685  $459
$548  $787  $504  $826

A) $533.00  B) $484.00  C) $525.50  D) $548.00  E) $518.00

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

$492  $776  $545  $855
$506  $761  $615  $830
$682  $890  $450  $574
$723  $473  $631  $527

A) $772.25  B) $631.00  C) $776.00  D) $768.50  E) $761.00

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

787  624  820  670
475  617  533  649
582  682  875  504
592  460  547  490

A) 297  B) 617  C) 166  D) 592  E) 157.5
28. The weights, in pounds, of 18 randomly selected adults are given below. Find the range.

<table>
<thead>
<tr>
<th>Weight (lb)</th>
<th>120</th>
<th>165</th>
<th>187</th>
<th>143</th>
<th>119</th>
<th>132</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>127</td>
<td>156</td>
<td>179</td>
<td>159</td>
<td>180</td>
<td>202</td>
</tr>
<tr>
<td></td>
<td>114</td>
<td>146</td>
<td>151</td>
<td>168</td>
<td>173</td>
<td>144</td>
</tr>
</tbody>
</table>

A) (114, 202) lb  
B) 202 lb  
C) (120, 202) lb  
D) 88 lb  
E) 78 lb

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

<table>
<thead>
<tr>
<th>Weight (lb)</th>
<th>144</th>
<th>165</th>
<th>187</th>
<th>143</th>
<th>119</th>
<th>132</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>127</td>
<td>156</td>
<td>179</td>
<td>159</td>
<td>180</td>
<td>202</td>
</tr>
<tr>
<td></td>
<td>114</td>
<td>146</td>
<td>151</td>
<td>168</td>
<td>173</td>
<td></td>
</tr>
</tbody>
</table>

A) 13 lb  
B) 17 lb  
C) 37 lb  
D) 30 lb  
E) 37.5 lb

30. Here are costs (in dollars) of 12 electric smoothtop ranges. Find the range.

<table>
<thead>
<tr>
<th>Cost (dollars)</th>
<th>825</th>
<th>930</th>
<th>615</th>
<th>525</th>
<th>1425</th>
<th>1030</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>630</td>
<td>725</td>
<td>740</td>
<td>1230</td>
<td>515</td>
<td>1025</td>
</tr>
</tbody>
</table>

A) $920  
B) $915  
C) $905  
D) $900  
E) $910

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

<table>
<thead>
<tr>
<th>Commute (miles)</th>
<th>19.4</th>
<th>16.9</th>
<th>42.0</th>
<th>39.7</th>
<th>12.1</th>
<th>10.5</th>
</tr>
</thead>
</table>

A) 40.9  
B) 13.89  
C) 3294.7  
D) 12.1  
E) 4258.7

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

<table>
<thead>
<tr>
<th>Price (dollars)</th>
<th>$304</th>
<th>$141</th>
<th>$389</th>
<th>$238</th>
<th>$427</th>
<th>$191</th>
<th>$309</th>
<th>$253</th>
</tr>
</thead>
</table>

A) $698,562.00  
B) $633,938.00  
C) $427  
D) $340.00  
E) $96.08

33. The weights (in ounces) of 27 tomatoes are listed below. Find the standard deviation.

<table>
<thead>
<tr>
<th>Weight (oz)</th>
<th>1.7</th>
<th>2.0</th>
<th>2.2</th>
<th>2.2</th>
<th>2.4</th>
<th>2.5</th>
<th>2.5</th>
<th>2.5</th>
<th>2.6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.6</td>
<td>2.6</td>
<td>2.6</td>
<td>2.6</td>
<td>2.7</td>
<td>2.8</td>
<td>2.8</td>
<td>2.8</td>
<td>2.9</td>
</tr>
<tr>
<td></td>
<td>2.9</td>
<td>2.9</td>
<td>3.0</td>
<td>3.0</td>
<td>3.1</td>
<td>3.1</td>
<td>3.3</td>
<td>3.6</td>
<td>4.2</td>
</tr>
</tbody>
</table>

A) 0.50 oz  
B) 0.51 oz  
C) 0.47 oz  
D) 0.49 oz  
E) 0.48 oz
34. The ages of the 21 members of a track and field team are listed below. Find the standard deviation.

\[
\begin{array}{cccccccc}
15 & 18 & 18 & 19 & 22 & 23 & 24 \\
24 & 24 & 25 & 25 & 26 & 26 & 27 \\
28 & 28 & 30 & 32 & 33 & 40 & 42 \\
\end{array}
\]

A) 6.7 B) 6.5 C) 6.4 D) 6.6 E) 6.3

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

\[
\begin{array}{cccccccccccccccc}
597 & 588 & 587 & 586 & 582 & 580 & 561 & 555 & 550 \\
548 & 542 & 540 & 538 & 537 & 534 & 532 & 529 & 526 \\
515 & 512 & 501 & 498 & 493 & 489 & 485 & 471 & 465 \\
462 & 458 & 444 & 435 & 432 & 431 & 407 & 373 \\
\end{array}
\]

A) 55 B) 56.6 C) 56 D) 58.3 E) 57

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

\[
\begin{array}{cccccccccccccccc}
603 & 585 & 574 & 572 & 569 & 565 & 564 & 549 \\
540 & 534 & 531 & 528 & 525 & 524 & 519 & 500 \\
485 & 480 & 478 & 475 & 471 & 465 & 458 & 455 \\
424 & 410 & 409 & 389 & 380 & 382 & 355 & 315 \\
\end{array}
\]

A) 75.3 B) 74.3 C) 75.5 D) 75 E) 73.3

37. Which set has the largest standard deviation?

<table>
<thead>
<tr>
<th>Set 1</th>
<th>Set 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>11</td>
<td>11</td>
</tr>
</tbody>
</table>

A) Set 1, because 6 and 6 in set 1 are farther from 6 than 5 and 7 in set 2.
B) Set 2, because 6 and 6 in set 2 are farther from 6 than 5 and 7 in set 1.
C) Neither, because set 1 and set 2 have the same standard deviation.
D) Set 1, because 5 and 7 in set 1 are farther from 6 than 6 and 6 in set 2.
E) Set 2, because 5 and 7 in set 2 are farther from 6 than 6 and 6 in set 1.

38. Which set has the largest standard deviation?

<table>
<thead>
<tr>
<th>Set 1</th>
<th>Set 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>110</td>
<td>30</td>
</tr>
<tr>
<td>130</td>
<td>50</td>
</tr>
<tr>
<td>140</td>
<td>60</td>
</tr>
<tr>
<td>150</td>
<td>70</td>
</tr>
<tr>
<td>200</td>
<td>120</td>
</tr>
</tbody>
</table>

A) Set 1, because 200 in set 1 is larger than 120 in set 2.
B) Set 1, because 110 and 200 in set 1 are larger than 30 and 120 in set 2.
C) Set 2, because set 2 has a smaller range than set 1.
D) Neither, because the values in set 1 are just the values in set 2 plus 80.
E) Set 2, because 110 and 200 in set 1 are larger than 30 and 120 in set 2.
39. Which set has the largest standard deviation?

<table>
<thead>
<tr>
<th>Set 1</th>
<th>Set 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>59</td>
</tr>
<tr>
<td>16</td>
<td>67</td>
</tr>
<tr>
<td>18</td>
<td>69</td>
</tr>
<tr>
<td>20</td>
<td>71</td>
</tr>
<tr>
<td>28</td>
<td>81</td>
</tr>
</tbody>
</table>

A) Set 2, because the minimum and maximum in set 2 are farther from the center.
B) Neither, because the values in set 2 are just the values in set 1 plus 49.
C) Set 2, because set 2 has a wider range and will have a smaller SD.
D) Set 1, because set 1 has a narrower range and will have a larger SD.
E) Set 1, because the minimum and maximum in set 1 are farther from the center.

40. A small company employs a supervisor at $1200 a week, an inventory manager at $800 a week, 5 stock boys at $300 a week, and 3 drivers at $700 a week. Which measure of center best describes a typical wage at this company, the mean at $560 or the median at $500?
   A) Median, because the distribution is skewed to the left.
   B) Mean, because there are no outliers.
   C) Mean, because the distribution is symmetric.
   D) Median, because of the outliers $800 and $1200.
   E) Median, because of the outlier $1200.

41. A small company employs a supervisor at $1200 a week, an inventory manager at $800 a week, 6 stock boys at $400 a week, and 4 drivers at $700 a week. Which measure of spread would best describe the payroll, the range, the IQR, or the standard deviation?
   A) IQR, because it would be least sensitive to the outlier at $1200.
   B) IQR, because the distribution is symmetric.
   C) IQR, because it would be least sensitive to the outliers at $800 and $1200.
   D) Standard deviation, because it would be least sensitive to the outlier at $1200.
   E) Range, because it would be least sensitive to the outlier at $1200.

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

<table>
<thead>
<tr>
<th>Count</th>
<th>Mean</th>
<th>StdDev</th>
<th>Median</th>
<th>IQR</th>
<th>Q1</th>
<th>Q3</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>4950</td>
<td>1531</td>
<td>5009</td>
<td>2009</td>
<td>4028</td>
<td>6037</td>
</tr>
</tbody>
</table>

Is the mean or median a "better" summary of the center of the distribution?
   A) Mean, because the distribution is quite symmetric.
   B) Median, because the IQR is smaller than the standard deviation.
   C) Median, because of the outliers.
   D) Neither, because these are not categorical data.
   E) Neither, because these are not quantitative data.
43. 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 center?

A) Mean: $979; Median: $705
   The mean is the most appropriate measure of center, because of the outliers.
B) Mean: $979; Median: $705
   The median is the most appropriate measure of center, because of the outliers.
C) Mean: $979; Median: $705
   The median is the most appropriate measure of center, because the outliers are not significant in the distribution.
D) Mean: $979; Median: $705
   The mean is the most appropriate measure of center, because the outliers are not significant in the distribution.
E) Mean: $942; Median: $700
   The median is the most appropriate measure of center, because of the outliers.
44. 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: $715; standard deviation: $769
   The IQR is the most appropriate measure of center, because the outliers are not significant in the distribution.

B) IQR: $715; standard deviation: $769
   The standard deviation is the most appropriate measure of center, because of the outliers.

C) IQR: $715; standard deviation: $769
   The IQR is the most appropriate measure of center, because of the outliers.

D) IQR: $715; standard deviation: $769
   The standard deviation is the most appropriate measure of center, because the outliers are not significant in the distribution.

E) IQR: $789.3; standard deviation: $740
   The IQR is the most appropriate measure of center, because of the outliers.

45. 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 center of this distribution?

A) Median, because the data are skewed to the left.
B) Mean, because the data are skewed to the left.
C) Median, because the data are skewed to the right.
D) Mean, because the data are skewed to the right.
E) Mean, because the data are symmetric.
46. Office workers were asked how long it took them to travel to work one morning. Here is the stem-and-leaf display.

\[
\begin{align*}
2 & | 0 0 0 2 3 4 4 5 7 8 \\
3 & | 0 2 5 7 \\
4 & | 1 2 7 8 9 \\
5 & | 0 2 8 \\
6 & | 0 5 \\
\end{align*}
\]

Without actually finding the mean and the median, would you expect the mean to be higher or lower than the median?

A) Higher, because the data are skewed to the left.
B) Lower, because the data are skewed to the left.
C) Higher, because the data are skewed to the right.
D) Lower, because the data are skewed to the right.
E) Neither, because the mean would be equal to the median.

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

\[
\begin{align*}
5 & | 9 \\
6 & | 3 5 8 \\
7 & | 2 4 4 7 9 \\
8 & | 3 5 5 8 \\
9 & | 1 3 7 \\
\end{align*}
\]

Would you use the median or the mean to describe the center of this distribution?

A) Mean, because the data are quite symmetric.
B) Median, because the data are skewed to the left.
C) Mean, because the data are skewed to the right.
D) Mean, because the data are skewed to the left.
E) Median, because the data are skewed to the right.
48. Shown below are the boxplot and summary statistics for the highest temperatures ever recorded (in °F) in 32 different U.S. states:

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

Which measures of center and spread would you use for this distribution?
A) Mean and IQR, because the outlier does not really affect the mean.
B) Mean and standard deviation, because the outlier affects the mean.
C) Median and standard deviation, because the outlier affects 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.

49. Shown below are the histogram and summary statistics for the reading scores of 29 fifth graders.

<table>
<thead>
<tr>
<th>Count</th>
<th>Mean</th>
<th>Median</th>
<th>StdDev</th>
<th>Min</th>
<th>Max</th>
<th>Q1</th>
<th>Q3</th>
</tr>
</thead>
<tbody>
<tr>
<td>29</td>
<td>4.2</td>
<td>4.6</td>
<td>1.3</td>
<td>1.3</td>
<td>5.9</td>
<td>3.5</td>
<td>5.4</td>
</tr>
</tbody>
</table>

Which measures of center and spread would you use for this distribution?
A) Mean and IQR, because the data is skewed to the left.
B) Mean and standard deviation, because the data is skewed to the left.
C) Mean and standard deviation, because the data is symmetric.
D) Median and standard deviation, because the data is skewed to the left.
E) Median and IQR, because the data is skewed to the left.
Find the five-number summary for the given data by hand.

50. A small company employs a supervisor at $1400 a week, an inventory manager at $800 a week, 5 stock boys at $400 a week, and 3 drivers at $600 a week.
   A) 1400, 400, 500, 600, 400 dollars
   B) 400, 400, 1000, 600, 1400 dollars
   C) 400, 400, 500, 600, 1400 dollars
   D) 2000, 400, 500, 1800, 1400 dollars
   E) 400, 400, 500, 800, 1400 dollars

51. The frequency table shows the heights (in inches) of 120 adults.

<table>
<thead>
<tr>
<th>Height</th>
<th>Count</th>
<th>Height</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>63</td>
<td>5</td>
<td>71</td>
<td>10</td>
</tr>
<tr>
<td>64</td>
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<td>72</td>
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<td>12</td>
<td>74</td>
<td>4</td>
</tr>
<tr>
<td>67</td>
<td>14</td>
<td>75</td>
<td>5</td>
</tr>
</tbody>
</table>

A) 60, 65, 66, 71, 75 in.
B) 60, 66, 67, 70, 75 in.
C) 60, 65, 66, 70, 75 in.
D) 60, 65, 67, 71, 75 in.
E) 60, 65, 67, 70, 75 in.

52. The frequency table shows the heights (in inches) of 130 adults.

<table>
<thead>
<tr>
<th>Height</th>
<th>Count</th>
<th>Height</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
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<td>68</td>
<td>23</td>
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<td>69</td>
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<td>62</td>
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<td>12</td>
<td>74</td>
<td>4</td>
</tr>
<tr>
<td>67</td>
<td>7</td>
<td>75</td>
<td>2</td>
</tr>
</tbody>
</table>

A) 60, 65, 68, 71, 75 in.
B) 60, 66, 67, 71, 75 in.
C) 60, 65, 68, 70, 75 in.
D) 60, 66, 67, 70, 75 in.
E) 60, 66, 68, 70, 75 in.
53. Here are the average mathematics achievement scores for ninth graders in 34 counties.

<table>
<thead>
<tr>
<th>591</th>
<th>588</th>
<th>587</th>
<th>586</th>
<th>582</th>
<th>580</th>
<th>561</th>
<th>555</th>
<th>554</th>
</tr>
</thead>
<tbody>
<tr>
<td>548</td>
<td>542</td>
<td>540</td>
<td>538</td>
<td>537</td>
<td>534</td>
<td>532</td>
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<td>515</td>
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<td>498</td>
<td>493</td>
<td>489</td>
<td>485</td>
<td>475</td>
<td>465</td>
</tr>
<tr>
<td>462</td>
<td>458</td>
<td>444</td>
<td>435</td>
<td>431</td>
<td>407</td>
<td>386</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A) 386, 475, 526, 554, 591
B) 386, 475, 529, 554, 591
C) 386, 485, 526, 555, 591
D) 386, 485, 529, 554, 591
E) 386, 475, 523, 554, 591

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

<table>
<thead>
<tr>
<th>592</th>
<th>585</th>
<th>574</th>
<th>572</th>
<th>569</th>
<th>565</th>
<th>564</th>
<th>541</th>
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</thead>
<tbody>
<tr>
<td>540</td>
<td>534</td>
<td>531</td>
<td>528</td>
<td>525</td>
<td>524</td>
<td>519</td>
<td>504</td>
</tr>
<tr>
<td>497</td>
<td>480</td>
<td>478</td>
<td>475</td>
<td>471</td>
<td>465</td>
<td>458</td>
<td>440</td>
</tr>
<tr>
<td>426</td>
<td>410</td>
<td>409</td>
<td>389</td>
<td>380</td>
<td>382</td>
<td>355</td>
<td>312</td>
</tr>
</tbody>
</table>

A) 312, 426, 426, 540, 592
B) 312, 426, 500.5, 540, 592
C) 312, 433, 500.5, 540.5, 592
D) 312, 426, 504, 540, 592
E) 312, 440, 500.5, 541, 592
Create a boxplot that represents the given data.
55. Here are the test scores of 32 students:

32 37 41 44 46 48 53 55
56 57 59 63 65 66 68 69
70 71 74 74 75 77 78 79
80 82 83 86 89 92 95 99

A) I  B) II  C) III  D) IV  E) V
Here are the highest temperatures ever recorded (in °F) in 32 different U.S. states:

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

A) I  B) II  C) III  D) IV  E) V
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 7.1 7.2 7.2
7.4 7.5 7.7 7.7 7.8 8.0 8.1 8.1 8.3 8.7

A) I  B) II  C) III  D) IV  E) V
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 71 71
73 73 74 76 77 78 79 80 81
81 82 83 85 89 92 93 94 97 98

A) I  B) II  C) III  D) IV  E) V
59. 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

A) I  B) II  C) III  D) IV  E) V
The normal monthly precipitation (in inches) for August is listed for 20 different U.S. cities.

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0.4</td>
<td>1.0</td>
<td>1.5</td>
<td>1.6</td>
<td>2.0</td>
</tr>
<tr>
<td>2.2</td>
<td>2.4</td>
<td>2.7</td>
<td>3.4</td>
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<td>3.6</td>
<td>3.6</td>
<td>3.7</td>
<td>3.7</td>
</tr>
<tr>
<td>3.9</td>
<td>4.1</td>
<td>4.2</td>
<td>4.2</td>
<td>7.0</td>
</tr>
</tbody>
</table>

A) I  B) II  C) III  D) IV  E) V
61. The weights (in ounces) of 27 tomatoes are listed below.

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

A) I   B) II   C) III   D) IV   E) V
62. 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

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

63. Here is an ogive of the distribution of students’ marks on their statistics test.

I  II  III
64. Here are the summary statistics for mathematics scores for one high-school graduating class.

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Mean</th>
<th>Median</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
<th>Q1</th>
<th>Q3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>17</td>
<td>60</td>
<td>63</td>
<td>18.6</td>
<td>30</td>
<td>100</td>
<td>52</td>
<td>78</td>
</tr>
<tr>
<td>Female</td>
<td>18</td>
<td>65</td>
<td>66</td>
<td>17.7</td>
<td>36</td>
<td>98</td>
<td>50</td>
<td>80</td>
</tr>
</tbody>
</table>

64.
65. The test scores of 15 students are listed below.

35  57  51  65  67
68  71  72  75  77
79  82  87  90  99

A) 35, 57  B) 99  C) 35, 99  D) 35  E) None

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

690  570  813  649
728  542  465  620
510  667  685  368
523  787  483  1086

A) 368  B) 620  C) 1086  D) 368, 986  E) None
67. The normal annual precipitation (in inches) is given below for 21 different U.S. cities.

<table>
<thead>
<tr>
<th>Precipitation (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>32.4</td>
</tr>
<tr>
<td>30.5</td>
</tr>
<tr>
<td>34.6</td>
</tr>
<tr>
<td>63.9</td>
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<tr>
<td>22.1</td>
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<tr>
<td>31.8</td>
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<tr>
<td>16.6</td>
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</tr>
<tr>
<td>31.4</td>
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<tr>
<td>24.2</td>
</tr>
<tr>
<td>12.4</td>
</tr>
<tr>
<td>35.4</td>
</tr>
</tbody>
</table>

A) 25.8
B) 8.6, 59.3, 63.9
C) 59.3, 63.9
D) 63.9
E) None

68. The National Education Association collects data on the number of years of teaching experience of high-school teachers. A sample taken this year of 19 high-school teachers yielded the following data on number of years of teaching experience.

<table>
<thead>
<tr>
<th>Years of Teaching Experience</th>
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<tbody>
<tr>
<td>16</td>
</tr>
<tr>
<td>24</td>
</tr>
<tr>
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<td>14</td>
</tr>
<tr>
<td>37</td>
</tr>
<tr>
<td>18</td>
</tr>
</tbody>
</table>

A) 1
B) 32, 37
C) 1, 37
D) 1, 32, 37
E) None

69. The weights (in ounces) of 27 tomatoes are listed below.

<table>
<thead>
<tr>
<th>Weight (in ounces)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.7</td>
</tr>
<tr>
<td>2.0</td>
</tr>
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<td>2.2</td>
</tr>
<tr>
<td>2.2</td>
</tr>
<tr>
<td>2.4</td>
</tr>
<tr>
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<td>3.3</td>
</tr>
<tr>
<td>3.6</td>
</tr>
<tr>
<td>4.2</td>
</tr>
</tbody>
</table>

A) 3.6, 4.2
B) 1.7, 3.6, 4.2
C) 1.7, 2.0
D) 1.7, 4.2
E) None

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

<table>
<thead>
<tr>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
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<tr>
<td>18</td>
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<td>18</td>
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<tr>
<td>19</td>
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<td>33</td>
</tr>
<tr>
<td>40</td>
</tr>
<tr>
<td>42</td>
</tr>
</tbody>
</table>

A) 25
B) 15, 40, 42
C) 15, 42
D) 42
E) None

71. Here are the test scores of 32 students:

<table>
<thead>
<tr>
<th>Test Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
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<td>92</td>
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<tr>
<td>95</td>
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<tr>
<td>99</td>
</tr>
</tbody>
</table>

A) 32, 95, 99
B) 32, 99
C) 99
D) 32
E) None
72. Here are the highest temperatures ever recorded (in °F) in 32 different U.S. states:

<table>
<thead>
<tr>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
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<tr>
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<tr>
<td>125</td>
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<tr>
<td>128</td>
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<tr>
<td>134</td>
</tr>
</tbody>
</table>

A) 100, 134  
B) 128, 134  
C) 100  
D) 134  
E) None

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

<table>
<thead>
<tr>
<th>Salary</th>
</tr>
</thead>
<tbody>
<tr>
<td>310</td>
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</tr>
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<td>1720</td>
</tr>
<tr>
<td>2500</td>
</tr>
<tr>
<td>3700</td>
</tr>
</tbody>
</table>

A) 310, 2500, 3700  
B) 3700  
C) 2500, 3700  
D) 2500  
E) None

74. The normal monthly precipitation (in inches) for August is listed for 20 different U.S. cities.

<table>
<thead>
<tr>
<th>Precipitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.4</td>
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</tr>
<tr>
<td>3.5</td>
</tr>
<tr>
<td>3.6</td>
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<tr>
<td>3.6</td>
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<tr>
<td>3.7</td>
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<tr>
<td>3.7</td>
</tr>
<tr>
<td>3.9</td>
</tr>
<tr>
<td>4.1</td>
</tr>
<tr>
<td>4.2</td>
</tr>
<tr>
<td>4.2</td>
</tr>
<tr>
<td>7.0</td>
</tr>
</tbody>
</table>

A) 7.0  
B) 0.4, 7.0  
C) 0.4  
D) 4.2, 7.0  
E) None

75. Solve the problem.

75. Do men and women run a 5 kilometer race at the same pace? Here are boxplots of the time (in minutes) for a race recently run in Chicago. Write a brief report discussing what these data show.

A) Men appear to run about 3 minutes faster than women, and the two distributions have different IQR.  
B) Women appear to run about 3 minutes faster than men, and the two distributions have different IQR.  
C) Women appear to run about 3 minutes faster than men, but the two distributions are very similar in shape and spread.  
D) Men appear to run about 3 minutes faster than women, but the two distributions are very similar in shape and spread.  
E) Men appear to run about 10 minutes faster than women, but the two distributions are very similar in shape and spread.
76. Describe what these boxplots tell you about the relationship between the state you live in and your salary, based on the same occupation.

A) IL and MA have very comparable salaries. The average salaries for these states are just below $40K, and their spreads are very close. NV’s average is the highest. The upper 50% of salaries for NV corresponds to the lower 50% of WA salaries.

B) IL and MA have very comparable salaries. The average salaries for these states are just above $40K, and their spreads are very close. NV is very comparable to IL and MA. The upper 50% of salaries for NV corresponds to the lower 50% of WA salaries.

C) IL and MA don’t have very comparable salaries. The average salaries for these states are just below $40K, and their spreads are different. NV is not very comparable to either IL or MA. The upper 50% of salaries for WA corresponds to the lower 50% of NV salaries.

D) IL and MA have very comparable salaries. The average salaries for these states are just below $40K, and their spreads are very close. NV is not very comparable to either IL or MA. The upper 50% of salaries for NV corresponds to the lower 50% of WA salaries.

E) IL and MA have very comparable salaries. The average salaries for these states are just below $40K, but their spreads are different. NV is not very comparable to either IL or MA. The upper 50% of salaries for NV corresponds to the lower 50% of WA salaries.
77. Here are 3 boxplots of weekly gas prices at a service station in the United States (price in $ per gallon). Compare the distribution of prices over the three years.

A) Gas price have been decreasing on average over the 3-year period, but the spread has been increasing. The distribution has been skewed to the right, and there were 3 high outliers in 2005.

B) Gas price have been increasing on average over the 3-year period, and the spread has been increasing as well. The distribution has been skewed to the right, and there were 3 high outliers in 2005.

C) Gas price have been increasing on average over the 3-year period, and the spread has been increasing as well. The distribution has been skewed to the left, and there were 3 high outliers in 2005.

D) Gas price have been decreasing on average over the 3-year period, and the spread has been decreasing. The distribution has been skewed to the left, and there were 3 high outliers in 2005.

E) Gas price have been increasing on average over the 3-year period, but the spread has been decreasing. The distribution has been skewed to the left, and there were 3 high outliers in 2005.
78. Here are boxplots of the points scored during the first 10 games of the basketball season for both Caroline and Alexandra. Summarize the similarities and differences in their performance so far.

A) Both girls have a median score of about 18 points per game. Alexandra is much more consistent, because her IQR is about 15 points, while Caroline’s is over 3.
B) The girls have a different average score per game. Caroline is much more consistent, because her IQR is about 4 points, while Alexandra’s is over 15.
C) Both girls have a median score of about 18 points per game. Caroline is much more consistent, because her IQR is about 6 points, while Alexandra’s is over 20.
D) Both girls have a median score of about 18 points per game. Caroline is much more consistent, because her IQR is about 4 points, while Alexandra’s is over 15.
E) The girls have a different average score per game, but the same median score of about 18 points per game. Their IQR are different, but this does not give anymore information on the girls’ performance.

79. Here are boxplots of the points scored during the first 10 games of the basketball season for both Caroline and Alexandra. The coach can take only one player to the state championship. Which one should she take knowing that she would like a safe player?

A) Both of them, because both girls have a median score of about 18 points per game.
B) Alexandra, because the IQR is the largest.
C) Alexandra, because she is the more consistent player.
D) Caroline, because she is the more consistent player.
E) Caroline, because the IQR is the largest.
80. The boxplots display case prices (in dollars) of white wines produced by three vineyards in the western United States. Which vineyard produces the most expensive wine?

A) Vineyard B, because it has the highest case price at about $120.
B) Vineyard B, because it has the highest case price at about $150.
C) Vineyard C, because it has the smallest IQR.
D) Vineyard A, because it has one outlier at about $145.
E) Vineyard A, because it has the smallest case price at about $60.

81. The boxplots display case prices (in dollars) of white wines produced by three vineyards in the western United States. Which vineyard produces the cheapest wine?

A) Vineyard C, because it has the smallest range.
B) Vineyard A, because it has the smallest case price at about $60.
C) Vineyard B, because it has the highest case price at about $150.
D) Vineyard C, because it has the smallest IQR.
E) Vineyard B, because it does not have any outliers.
82. The boxplots display case prices (in dollars) of white wines produced by three vineyards in the western United States. In which vineyard are the wines generally more expensive?

A) Vineyard B, because it has the highest case price at about $150.
B) Vineyard C, because it has the smallest range.
C) Vineyard C, because it has the highest average price and the smallest spread.
D) Vineyards A and B, because they have a similar average price, and roughly the same spread.
E) Vineyard A, because it has one outlier at about $145.
The boxplots display case prices (in dollars) of white wines produced by three vineyards in the western United States. Describe these wine prices.

A) Vineyards A and B have about the same average price; the boxplots show similar medians and similar IQRs. Vineyard C has consistently higher prices except for one low outlier, and a more consistent pricing as shown by the larger IQR.

B) Vineyards A and B have about the same average price; the boxplots show similar medians and similar IQRs. Vineyard C has higher prices except for one low outlier, and a more consistent pricing as shown by the smaller IQR. The three distributions are roughly symmetric.

C) Vineyards A and B have about the same average price; the boxplots show similar medians and similar IQRs. Vineyard C has higher prices except for one low outlier, and a less consistent pricing as shown by the larger IQR.

D) Vineyards A and B have about the same average price; the boxplots show similar medians and similar IQRs. Vineyard C has higher prices except for one low outlier, and a more consistent pricing as shown by the smaller IQR.

E) Vineyards A and B have different average price, but a similar spread. Vineyard C has lower prices except for one low outlier, and a more consistent pricing as shown by the smaller IQR.
84. Here are the summary statistics for mathematics scores for one high-school graduating class, and the parallel boxplots comparing the scores of male and female students. Write a brief report on these results. Be sure to discuss shape, center, and spread of the scores.

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>Mean</th>
<th>Median</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
<th>Q1</th>
<th>Q3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>17</td>
<td>60</td>
<td>63</td>
<td>18.6</td>
<td>30</td>
<td>100</td>
<td>52</td>
<td>78</td>
</tr>
<tr>
<td>Female</td>
<td>18</td>
<td>65</td>
<td>66</td>
<td>17.7</td>
<td>36</td>
<td>98</td>
<td>50</td>
<td>80</td>
</tr>
</tbody>
</table>

A) Median score by females at 66 points is 3 points higher than that by males, and female mean is higher by 5. The middle 50% for both group is close with a IQR at 26 for the males and 30 for the females. The males have a larger range from 30 to 100. The distribution is right-skewed for the females and symmetric for the males.

B) Median score by females at 66 points is 3 points higher than that by males, and female mean is higher by 5. The middle 50% for both group is close with a IQR at 26 for the males and 30 for the females. The males have a smaller range from 30 to 100. Both distributions are left-skewed.

C) Median score by females at 66 points is 3 points higher than that by males, and female mean is higher by 5. The middle 50% for both group is close with a IQR at 26 for the males and 30 for the females. The males have a larger range from 30 to 100. The distribution is right-skewed for the males and symmetric for the females.

D) Median score by females at 66 points is 3 points higher than that by males, and male mean is higher by 5. The middle 50% for both group is close with a IQR at 30 for the males and 26 for the females. The males have a larger range from 30 to 100. The distribution is right-skewed for the males and symmetric for the females.

E) Median score by females at 66 points is 3 points higher than that by males, and female mean is higher by 5. The middle 50% for both group is close with a IQR at 26 for the males and 30 for the females. The males have a larger range from 30 to 100. Both distributions are right-skewed.
Three statistics classes (50 students each) took the same test. Shown below are histograms of the scores for the classes. Use the histograms to answer the question.

85. Which class had the highest mean score?
   A) Class 2
   B) Class 1 and class 3
   C) Class 1
   D) Class 3
   E) None, because the classes had the same mean.

86. Which class had the highest median score?
   A) Class 1
   B) Class 3
   C) Class 2
   D) Class 1 and class 3
   E) None, because the classes had the same median.

87. For which class are the mean and median most different?
   A) Class 1, because the shape is skewed to the left.
   B) Class 2, because the shape is skewed to the right.
   C) Class 3, because the shape is symmetric.
   D) Class 2, because the shape is symmetric.
   E) Class 2, because the shape is skewed to the left.

88. For class 2, compare the mean and the median.
   A) Median is lower than mean.
   B) Median is higher than mean.
   C) Mean is equal to median.
   D) Mean is higher than median.
   E) No comparison possible

89. Which class had the smallest standard deviation?
   A) Class 3, because the shape has the highest number of students.
   B) Class 2, because the shape is skewed.
   C) Class 1, because the shape is not perfectly symmetric.
   D) Class 3, because the shape is symmetric.
   E) None, because the classes had the same standard deviation.
90. Which class had the largest standard deviation?
   A) Class 3, because the shape has the highest number of students.
   B) Class 1, because the shape is not perfectly symmetric.
   C) Class 3, because the shape is symmetric.
   D) Class 2, because the shape is skewed.
   E) None, because the classes had the same standard deviation.

91. Which class had the smallest IQR?
   A) Class 3, because the shape has the highest number of students.
   B) Class 1, because the shape is fairly symmetric.
   C) Class 2, because the shape is skewed.
   D) Class 3, because the shape is symmetric.
   E) None, because all the classes had the same IQR.

92. Which class do you think performed better on the test?
   A) Class 3, because 74% of class 3 scored at or above the medians of 1 and 2.
   B) Class 2, because it has the highest median and 50% of class 2 scored at or above the medians of 1 and 3.
   C) Class 1, because it has the smallest median and 70% of class 1 scored at or above the medians of 2 and 3.
   D) Class 2, because it has different mean and median and 70% of class 2 scored at or above the medians of 1 and 3.
   E) Class 2, because it has the highest median and 70% of class 2 scored at or above the medians of 1 and 3.

93. How would you describe the shape of each distribution?
   A) Class 1: fairly symmetric, spread out ranging from about 40 to 90
      Class 2: left-skewed, spread out ranging from about 40 to 90
      Class 3: asymmetric, spread out ranging from about 40 to 90
   B) Class 1: left-skewed, spread out ranging from about 40 to 90
      Class 2: right-skewed, spread out ranging from about 40 to 90
      Class 3: symmetric, spread out ranging from about 40 to 90
   C) Class 1: fairly symmetric, spread out ranging from about 40 to 90
      Class 2: left-skewed, spread out ranging from about 40 to 90
      Class 3: symmetric, spread out ranging from about 40 to 90
   D) Class 1: left-skewed, spread out ranging from about 40 to 90
      Class 2: left-skewed, spread out ranging from about 40 to 90
      Class 3: symmetric, spread out ranging from about 40 to 90
   E) Class 1: fairly symmetric, spread out ranging from about 40 to 90
      Class 2: right-skewed, spread out ranging from about 40 to 90
      Class 3: symmetric, spread out ranging from about 40 to 90
94. Match each class with the corresponding boxplot below.

A) Class 1 is C
   Class 2 is B
   Class 3 is A
B) Class 1 is B
   Class 2 is C
   Class 3 is A
C) Class 1 is B
   Class 2 is A
   Class 3 is C
D) Class 1 is A
   Class 2 is B
   Class 3 is C
E) Class 1 is C
   Class 2 is A
   Class 3 is B

95. Solve the problem.

95. Here are summary statistics for the normal annual precipitation (in inches) for 21 different U.S. cities.

<table>
<thead>
<tr>
<th>Count</th>
<th>Mean</th>
<th>Median</th>
<th>StdDev</th>
<th>Min</th>
<th>Max</th>
<th>Q1</th>
<th>Q3</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>23.9</td>
<td>22.7</td>
<td>12.2</td>
<td>5.1</td>
<td>51.7</td>
<td>14.7</td>
<td>30.3</td>
</tr>
</tbody>
</table>

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.
96. Here are summary statistics for the normal monthly precipitation (in inches) for August for 20 different U.S. cities.

<table>
<thead>
<tr>
<th>Count</th>
<th>Mean</th>
<th>Median</th>
<th>StdDev</th>
<th>Min</th>
<th>Max</th>
<th>Q1</th>
<th>Q3</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>3.23</td>
<td>3.45</td>
<td>1.2</td>
<td>0.4</td>
<td>7.0</td>
<td>2.1</td>
<td>3.8</td>
</tr>
</tbody>
</table>

Would you describe this distribution as symmetric or skewed?

A) 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.
B) 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.
C) Symmetric, because the mean and the median are close.
D) 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.
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.

97. Here are summary statistics for the normal monthly precipitation (in inches) in August for 20 different U.S. cities.

<table>
<thead>
<tr>
<th>Count</th>
<th>Mean</th>
<th>Median</th>
<th>StdDev</th>
<th>Min</th>
<th>Max</th>
<th>Q1</th>
<th>Q3</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>3.23</td>
<td>3.45</td>
<td>1.2</td>
<td>0.4</td>
<td>7.0</td>
<td>2.1</td>
<td>3.8</td>
</tr>
</tbody>
</table>

Write a few sentences about the normal monthly precipitation in August.

A) The 20 precipitations range in size between 0.4 and 7 inches. The median amount is 3.45 inches, so half are larger and half are smaller. The middle 50% of these precipitations ranges between 2.1 and 3.8 inches. The distribution is skewed to the right, with no outliers.
B) The 20 precipitations range in size between 0.4 and 7 inches. The median amount is 3.45 inches, so half are larger and half are smaller. The middle 50% of these precipitations ranges between 2.1 and 3.8 inches. The distribution is skewed to the right, with at least the outlier 7 inches.
C) The 20 precipitations range in size between 0.4 and 7 inches. The median amount is 3.45 inches, so half are larger and half are smaller. The middle 50% of these precipitations ranges between 0.4 and 3.8 inches. The distribution is skewed to the left, with at least the outlier 0.4 inch.
D) The 20 precipitations range in size between 0.4 and 7 inches. The median amount is 3.23 inches, so half are larger and half are smaller. The middle 50% of these precipitations ranges between 2.1 and 3.45 inches. The distribution is skewed to the right, with at least the outlier 7 inches.
E) The 20 precipitations range in size between 0.4 and 7 inches. The median amount is 3.45 inches, so half are larger and half are smaller. The middle 50% of these precipitations ranges between 2.1 and 3.8 inches. The distribution is skewed to the right, with at least the outlier 0.4 inch.
Shown below are the boxplot, the histogram and summary statistics for the highest temperatures ever recorded (in °F) in 32 different U.S. states:

<table>
<thead>
<tr>
<th>Count</th>
<th>Mean</th>
<th>Median</th>
<th>StdDev</th>
<th>Min</th>
<th>Max</th>
<th>Q1</th>
<th>Q3</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>114.2</td>
<td>114.5</td>
<td>7.7</td>
<td>100</td>
<td>134</td>
<td>107.5</td>
<td>118</td>
</tr>
</tbody>
</table>

Write a few sentences describing the distribution.

A) 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.

B) 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.

C) 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.

D) 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.

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

<table>
<thead>
<tr>
<th>Count</th>
<th>Mean</th>
<th>Median</th>
<th>StdDev</th>
<th>Min</th>
<th>Max</th>
<th>Q1</th>
<th>Q3</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>978.8</td>
<td>705</td>
<td>765.7</td>
<td>310</td>
<td>3700</td>
<td>510</td>
<td>1225</td>
</tr>
</tbody>
</table>

Write a few sentences describing the distribution.

A) 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.

B) 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.

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 $510 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 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.

E) 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 $510 and $1225 for an IQR of $520.
100. Shown below are the boxplot, the histogram and summary statistics for the weights (in pounds) of 30 newborn babies:

<table>
<thead>
<tr>
<th>Count</th>
<th>Mean</th>
<th>Median</th>
<th>StdDev</th>
<th>Min</th>
<th>Max</th>
<th>Q1</th>
<th>Q3</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>6.9</td>
<td>7.0</td>
<td>0.8</td>
<td>5.5</td>
<td>8.7</td>
<td>6.4</td>
<td>7.7</td>
</tr>
</tbody>
</table>

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 left. There are no outliers. The mean newborn baby weight was 7 lb with an IQR of 1.3 lb.
D) 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.
E) 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.
Here is the stem-and-leaf display of the midterm test scores for the seventh-period mathematics class.

\[
\begin{array}{c}
10 & 0 \\
9 & 1, 1 \\
8 & 0, 0, 1, 1, 2, 3, 5, 5, 6, 6, 7, 8 \\
7 & 5, 5, 5, 8, 8, 9 \\
6 & 4, 7, 7, 8 \\
5 & 3, 9 \\
4 \\
3 & 3 \\
2 & 9 \\
1 \\
0 \\
\end{array}
\]

Write a few sentences describing this distribution.

A) 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.

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). There are no outliers.

C) 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.

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). The first two scores are outliers.

E) 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.
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 26 to 66, for an IQR of 40. About 55% of the students had a mark less than 50.

B) 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.

C) 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.

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 18 to 75, for an IQR of 57. 55% of the students had a mark less than 50.

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

<table>
<thead>
<tr>
<th>Count</th>
<th>Mean</th>
<th>Median</th>
<th>StdDev</th>
<th>Min</th>
<th>Max</th>
<th>Q1</th>
<th>Q3</th>
</tr>
</thead>
<tbody>
<tr>
<td>29</td>
<td>4.2</td>
<td>4.6</td>
<td>1.3</td>
<td>1.3</td>
<td>5.9</td>
<td>3.6</td>
<td>5.2</td>
</tr>
</tbody>
</table>

Write a brief summary of the performance of the fifth graders.
A) The distribution is unimodal and skewed to the left. The median is 4.2, 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.
B) 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. The score of 1.3 is an outlier.
C) 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 3.6 and 5.2, for an IQR of 1.6. There are no outliers.
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.

Provide an appropriate response.

104. A professor has kept records on grades that students have earned in his class. If he wants to examine the percentage of students earning the grades A, B, C, D, and F during the most recent term, which kind of plot could he make?

A) pie chart    B) dotplot    C) timeplot    D) boxplot    E) histogram
105. Which is true of the data shown in the histogram?

![Histogram of Data](image)

I. The distribution is approximately symmetric.
II. The mean and median are approximately equal.
III. The median and IQR summarize the data better than the mean and standard deviation.

A) I and II
B) I, II, and III
C) I only
D) I and III
E) III only

106. 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) It cannot be determined.
B) 84.3
C) 85.0
D) 85.7
E) none of these

107. Your Stats teacher tells you your test score was the 3rd quartile for the class. Which is true?

I. You got 75% on the test.
II. You can't really tell what this means without knowing the standard deviation.
III. You can't really tell what this means unless the class distribution is nearly Normal.

A) II only
B) none of these
C) II and III
D) I only
E) III only

108. The five-number summary of credit hours for 24 students in a statistics class is:

<table>
<thead>
<tr>
<th>Min</th>
<th>Q1</th>
<th>Median</th>
<th>Q3</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.0</td>
<td>15.0</td>
<td>16.5</td>
<td>18.0</td>
<td>22.0</td>
</tr>
</tbody>
</table>

Which statement is true?

A) There are both low and high outliers in the data.
B) There is at least one high outlier in the data.
C) There is at least one low outlier in the data.
D) There are no outliers in the data.
E) None of the above.
109. Which of the following summaries are changed by adding a constant to each data value?
   I. the mean
   II. the median
   III. the standard deviation
   A) III only
   B) I and III
   C) I only
   D) I and II
   E) I, II, and III

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

110. The World Almanac and Book of Facts 2004 reported the percent of people not covered by health insurance in the 50 states and Washington, D.C., for the year 2002. Computer output gives these summaries for the percent of people not covered by health insurance:

<table>
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<th>Q3</th>
<th>Max</th>
<th>Mean</th>
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<tbody>
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<td>7.9</td>
<td>10.8</td>
<td>13.4</td>
<td>16.7</td>
<td>25.8</td>
<td>13.9</td>
<td>3.6</td>
</tr>
</tbody>
</table>

Were any of the states outliers? Explain how you made your decision.

111. The World Almanac and Book of Facts 2004 reported the percent of people not covered by health insurance in the 50 states and Washington, D.C., for the year 2002. Computer output gives these summaries for the percent of people not covered by health insurance:

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</table>

A histogram of the data is as follows:

Is it more appropriate to use the mean and standard deviation or the median and IQR to describe these data? Explain.
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

112. The SPCA has kept these data records for the past 20 years. If they want to show the trend in the number of dogs they have housed, what kind of plot should they make?
   A) boxplot  
   B) histogram  
   C) timeplot  
   D) pie chart  
   E) bar graph

113. The veterinary bills for the dogs are summarized in the ogive shown. Estimate the IQR of these expenses.

   A) $75  
   B) $150  
   C) $100  
   D) $50  
   E) $200

114. 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) 69 mph
   B) It cannot be determined.
   C) 67 mph
   D) 68 mph
   E) none of these

115. Which is true of the data shown in the histogram?
   I. The distribution is skewed to the right.
   II. The mean is probably smaller than the median.
   III. We should use median and IQR to summarize these data.
   A) I, II, and III
   B) III only
   C) II and III only
   D) II only
   E) I only
116. The best estimate of the standard deviation of the men's weights displayed in this dotplot is

A) 15
B) 40
C) 10
D) 25
E) 35

117. If we want to discuss any gaps and clusters in a data set, which of the following should not be chosen to display the data set?

A) stem-and-leaf plot
B) dotplot
C) histogram
D) boxplot
E) any of these would work

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

118. In their October 2003 issue, Consumer Reports evaluated the price and performance of 23 models of cordless phones. Computer output gives these summaries for the prices:

Min  Q1  Median  Q3  Max  MidRange  Mean  TrMean  SD
15   30   50    110  200  107.5     71.75  67.63  52.08

Were any of the prices outliers? Explain how you made your decision.

119. In their October 2003 issue, Consumer Reports evaluated the price and performance of 23 models of cordless phones. Computer output gives these summaries for the prices:

Min  Q1  Median  Q3  Max  MidRange  Mean  TrMean  SD
15   30   50    110  200  107.5     71.75  67.63  52.08

One of the manufacturers advertises a cordless phone "economy-priced at only $31.95". Would you consider that to be a very low price? Explain.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

120. The mean number of hours worked for the 30 males was 6, and for the 20 females was 9. The overall mean number of hours worked...

A) is 6.5
B) cannot be determined.
C) is 7.5
D) is 7.2
E) is none of these.
121. Which is true of the data whose distribution is shown?

I. The distribution is skewed to the right.
II. The mean is probably smaller than the median.
III. We should summarize with mean and standard deviation.

A) II only
B) II and III
C) I only
D) I, II, and III
E) I and II

122. The standard deviation of the data displayed in this dotplot is most likely to be...

A) 18
B) 12
C) 8
D) 5
E) 20

123. The ages of people attending the opening show of a new movie are summarized in the ogive shown. Estimate the IQR of the ages.

A) 21
B) 13
C) 37
D) 30
E) 5
124. Environmental researchers have collected rain acidity data for several decades. They want to see if there is any evidence that attempts to reduce industrial pollution have produced a trend toward less acidic rainfall. They should display their data in a(n)...  
   A) boxplot  
   B) bar graph  
   C) contingency table  
   D) histogram  
   E) timeplot

125. An automobile service shop reported the summary statistics shown for repair bills (in $) for their customers last month.  

<table>
<thead>
<tr>
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<tr>
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</tr>
<tr>
<td>Q1</td>
<td>88</td>
</tr>
<tr>
<td>Median</td>
<td>132</td>
</tr>
<tr>
<td>Q3</td>
<td>308</td>
</tr>
<tr>
<td>Max</td>
<td>1442</td>
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<tr>
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<td>284</td>
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Were any of the bills outliers? Show how you made your decision.

126. An automobile service shop reported the summary statistics shown for repair bills (in $) for their customers last month.  

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</table>

After checking out a problem with your car the service manager gives you an estimate of “only $90.” Is he right to imply that your bill will be unusually low? Explain briefly.
1. B
2. A
3. D
4. C
5. E
6. B
7. B
8. C
9. C
10. B
11. A
12. A
13. D
14. D
15. C
16. D
17. B
18. C
19. D
20. B
21. C
22. C
23. C
24. E
25. A
26. D
27. E
28. D
29. D
30. E
31. B
32. E
33. D
34. A
35. C
36. B
37. E
38. D
39. A
40. E
41. A
42. E
43. B
44. C
45. C
46. C
47. A
48. E
49. E
50. C
51. D
52. E
53. A
54. C
55. B
56. A
57. E
58. E
59. B
60. C
61. C
62. A
63. D
64. D
65. D
66. C
67. C
68. D
69. D
70. B
71. E
72. D
73. C
74. A
75. D
76. D
77. E
78. D
79. D
80. B
81. B
82. C
83. D
84. C
85. A
86. C
87. E
88. B
89. D
90. D
91. D
92. E
93. C
94. E
95. A
96. E
97. B
98. D
99. B
100. A
101. D
102. A
103. E
104. A
105. A
106. D
107. B
108. D
109. D

110. Were any of the states outliers? Explain how you made your decision.
    \[ IQR = Q_3 - Q_1 = 16.7 - 10.8 = 5.9 \]
    \[ 1.5(IQR) = 1.5(5.9) = 8.85 \]
    \[ Q_3 + 1.5(IQR) = 16.7 + 8.85 = 25.55 < \text{Max}, \text{ so there is at least one high outlier} \]
    \[ Q_1 - 1.5(IQR) = 10.8 - 8.85 = 1.95 < \text{Min}, \text{ so there are no low outliers.} \]

111. It is more appropriate to use the median and IQR to describe these data, since the distribution is skewed right.

112. C
113. C
114. C
115. C
116. D
117. D

118. \[ IQR = Q_3 - Q_1 = 110 - 30 = 80 \]
    \[ 1.5(IQR) = 1.5(80) = 120 \]
    \[ Q_3 + 1.5(IQR) = 110 + 120 = 230; \text{ Max (200) < Q_3 + 1.5(IQR), so no high outliers.} \]
    \[ Q_1 - 1.5(IQR) = 30 - 120 = -90; \text{ Min (15) > Q_1 - 1.5(IQR), so no low outliers.} \]

119. A price of $31.95 is slightly above the first quartile, so over 25% of phones cost less. No, the advertised price would not be a very low price. (Or: The advertised price is only 0.76 standard deviations below the mean. This is not an unusually low price.)

120. D
121. C
122. B
123. B
124. E

125. Yes. \[ IQR = 308 - 88 = 220. \] The upper fence for outliers is one and a half IQR’s above the third quartile, or \[ 308 + 1.5(220) = 638. \] The maximum repair bill was $1442, well above $638, so it is certainly an outlier.

126. No. $90 is higher than over 25% of the bills, so it is not unusually low.