1. Listed below are the nicotine amounts (in mg per cigarette) for samples of filtered and nonfiltered cigarettes. Find the coefficient of variation for each of the two sets of data, then compare the variation.

Full data set

Nonfiltered	1.1	1.7	1.8	1.1	1.1	1.3	1.1	1.5	1.0	1.3	1.2	1.0	1.1
	1.1	1.1	1.7	1.5	1.1	1.3	1.6	1.4	1.2	1.2	1.2	1.2	
Filtered	0.4	0.9	1.1	0.7	0.9	1.0	1.1	1.1	1.2	0.8	0.7	0.9	0.7
	1.0	0.1	1.0	1.1	0.9	1.1	1.0	0.6	1.2	0.6	1.2	1.1	

The coefficient of variation for the nicotine amounts (in mg per cigarette) for samples of nonfiltered cigarettes is ☐ %.
(Round to three decimal places as needed.)

The coefficient of variation for the nicotine amounts (in mg per cigarette) for samples of filtered cigarettes is ☐ %.
(Round to three decimal places as needed.)

Is there a difference in variation between the two data sets?

○ A. There is no significant difference in the variations.

○ B. The filtered cigarettes have considerably less variation than the nonfiltered cigarettes.

○ C. The nonfiltered cigarettes have considerably less variation than the filtered cigarettes.

2. Because the mean is very sensitive to extreme values, it is not a resistant measure of center. The trimmed mean is more resistant. To find the 10% trimmed mean for a data set, first arrange the data in order, then delete the bottom 10% of the values and the top 10% of the values, then calculate the mean of the remaining values. For the following credit-rating scores, find (a) the mean, (b) the 10% trimmed mean, and (c) the 20% trimmed mean. How do the results compare?

711	715	780	810	800
789	711	681	773	611
701	837	766	530	655
563	746	792	703	756

a. The mean is ☐ .
(Round to one decimal place as needed.)

b. The 10% trimmed mean is ☐ .
(Round to one decimal place as needed.)

c. The 20% trimmed mean is ☐ .
(Round to one decimal place as needed.)

How do the results compare?

○A. The distribution of the data appears to be skewed to the left because the results appear to show a trend of increasing values as the percentage of trim increases.

○B. There is zero skew in the distribution of the data because the results are not dramatically different.

○C. The distribution of the data appears to be skewed to the right because the results appear to show a trend of decreasing values as the percentage of trim increases.

3. The two boxplots correspond to the service times from two different companies that repair air conditioning units. They are drawn on the same scale. The top boxplot corresponds to Qool Air, Inc., and the bottom boxplot corresponds to the Fresh Air company. Which company has less variation in repair times? Which company should have more predictable costs?
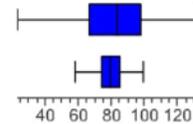
Choose the correct answer below.

○A. Qool has less variation. Because Qool has less variation, estimates of repair costs will tend to be more accurate, so the costs will tend to be more predictable.

○B. Qool has less variation. Because Qool has less variation, estimates of repair costs will tend to be less accurate. Thus, Fresh will have more predictable costs.

○C. Fresh has less variation. Because Fresh has less variation, estimates of repair costs will tend to be more accurate, so the costs will tend to be more predictable.

○D. Fresh has less variation. Because Fresh has less variation, estimates of repair costs will tend to be less accurate. Thus, Qool will have more predictable costs.

4. Find the (a) mean, (b) median, (c) mode, and (d) midrange for the given sample data.

Listed below are the amounts of personal income (in dollars) for five states.

$25,148 $26,163 $32,976 $23,542 $32,161

(a) The mean per capita income is $☐.
(Round to the nearest dollar as needed.)

(b) The median per capita income is $☐.
(Round to the nearest dollar as needed.)

(c) Select the correct choice below and fill in any answer boxes within your choice.

○A. The mode per capita income is $▓.
      (Use a comma to separate answers as needed.)

○B. There is no mode.

(d) The midrange of the data set is $☐.
(Round to the nearest dollar as needed.)

5. A woman wrote to a newspaper advice columnist and claimed that she gave birth 313 days after a visit from her husband, who was in the Navy. Lengths of pregnancies have a mean of 267.7 days and a standard deviation of 15.5 days. Find the z score for 313 days. Is such a length unusual?

The z score is ☐. (Round to two decimal places as needed.)

Is a pregnancy length of 313 days unusual?

○A. Yes, because its corresponding z score is less than 2.

○B. Yes, because its corresponding z score is greater than 2.

○C. No, because its corresponding z score is less than 2.

○D. No, because its corresponding z score is greater than 2.

6. An insurance institute conducted tests with crashes of new cars traveling at 6 mi/h. The total cost of the damages was found for a simple random sample of the tested cars and listed below. Find the (a) mean, (b) median, (c) mode, and (d) midrange for the given sample data. Do the different measures of center differ very much?

$7,456 $4,902 $8,962 $6,430 $4,263

a. The mean is $ ☐ .
(Type an integer or a decimal.)

b. The median is $ ☐ .
(Type an integer or a decimal.)

c. Select the correct choice below and fill in any answer boxes in your choice.

○ A. The mode is $ ☐ .
   (Use a comma to separate answers as needed.)

○ B. There is no mode.

d. The midrange is $ ☐ .
(Type an integer or a decimal.)

Do the different measures of center differ very much?

○ A. There is a very large difference between the three measures.

○ B. The different measures of center do not differ by very large amounts.

○ C. The median and mean differ by a very large amount.

○ D. Only the mean is different by a large amount.

7. Heights of women have a bell-shaped distribution with a mean of 156 cm and a standard deviation of 6 cm. Using Chebyshev's theorem, what do we know about the percentage of women with heights that are within 2 standard deviations of the mean? What are the minimum and maximum heights that are within 2 standard deviations of the mean?

At least ☐ % of women have heights within 2 standard deviations of 156 cm.
(Round to the nearest percent as needed.)

The minimum height that is within 2 standard deviations of the mean is ☐ cm.

The maximum height that is within 2 standard deviations of the mean is ☐ cm.

8. The data listed below represent the yield for regular corn seed. Find the 5-number summary and construct a boxplot.

    1513 1902 1910 2487 1616 1960 2051 1327 1449 2101 1939 ▭

The 5-number summary is ☐ , ☐ , ☐ , ☐ , ☐ .
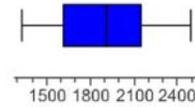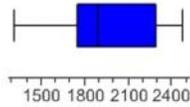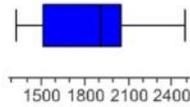(Type exact answers. Use ascending order.)

Choose the correct boxplot of the data below.

○A.   ○B.   ○C.

9. Listed below are the durations (in hours) of a simple random sample of all flights of a space shuttle program. Find the range, variance, and standard deviation for the sample data. Is the lowest duration time unusual? Why or why not?

    77 99 230 198 164 267 190 378 252 230 380 337 225 247 0 ▭

The range of the sample data is ☐ hours. (Type an integer or adecimal.)

The variance of the sample data is ☐ .
(Round to three decimal places as needed.)

The standard deviation of the sample data is ☐ hours.
(Round to three decimal places as needed.)

Is the lowest duration time unusual? Why or why not?

○A. Yes, because the lowest value in a data set is usually an outlier.

○B. No, because the sample is random.

○C. Yes, because it is more that two standard deviations below the mean.

○D. No, because it is within two standard deviations of the mean.

10. In an editorial, the *Poughkeepsie Journal* printed this statement: "The median price − the price exactly in between the highest and lowest − ..." Does this statement correctly describe the median? Why or why not?

Choose the correct answer below.

○A. Yes. It correctly describes the median.

○B. No. It describes the midrange, not the median.

○C. No. It describes the mean, not the median.

○D. No. It describes the mode, not the median.

11. Waiting times (in minutes) of customers in a bank where all customers enter a single waiting line and a bank where customers wait in individual lines at three different teller windows are listed below. Find the mean and median for each of the two samples, then compare the two sets of results.

| Single Line | 6.3 | 6.5 | 6.7 | 6.8 | 7.0 | 7.2 | 7.5 | 7.6 | 7.6 | 7.6 |
| Individual Lines | 4.1 | 5.3 | 6.0 | 6.1 | 6.7 | 7.5 | 7.8 | 8.4 | 9.1 | 9.8 |

The mean waiting time for customers in a single line is ☐ minutes.

The median waiting time for customers in a single line is ☐ minutes.

The mean waiting time for customers in individual lines is ☐ minutes.

The median waiting time for customers in individual lines is ☐ minutes.

Determine whether there is a difference between the two data sets that is not apparent from a comparison of the measures of center. If so, what is it?

○A. The times for customers in a single line are much more varied.

○B. The times for customers in individual lines are much more varied.

○C. There is no difference between the two data sets.

12. Below are 36 sorted ages of an acting award winner. Find the percentile corresponding to age 51 using the method presented in the textbook.

17	23	26	28	31	34	38	38	40	41
42	44	48	51	53	54	55	56	56	58
58	60	65	68	70	71	72	73	73	74
75	76	76	78	78	79				

percentile of value 51 = ☐ (Round to the nearest integer as needed.)

13. Six different second-year medical students at Bellevue Hospital measured the blood pressure of the same person. The systolic readings (in mmHg) are listed below. Find the range, variance, and standard deviation for the given sample data. If the subject's blood pressure remains constant and the medical students correctly apply the same measurement technique, what should be the value of the standard deviation?

    145   120   123   123   129   128 ▭

    Range = ☐ mmHg

    Sample variance = ☐ mmHg^2 (Round to the nearest tenth as needed.)

    Sample standard deviation = ☐ mmHg (Round to the nearest tenth as needed.)

    What should be the value of the standard deviation?

    ○A. Ideally, the standard deviation would be one because this is the lowest standard deviation that can be achieved.

    ○B. Ideally, the standard deviation would be one because all the measurements should be the same.

    ○C. Ideally, the standard deviation would be zero because all the measurements should be the same.

    ○D. There is no way to tell what the standard deviation should be.

14. Find the third quartile Q_3 of the list of 24 sorted values shown below.

    30 32 35 35 36 38 39 41 43 47 47 52 53 53 54 54 55 55 59 60 75 76 78 79 ▭

    The third quartile Q_3 is ☐. (Simplify your answer.)

15. Find the standard deviation of sample data summarized in a frequency distribution table by using the formula below, where x represents the class midpoint and f represents the class frequency.

    $$s = \sqrt{\frac{n[\sum (f \cdot x^2)] - [\sum (f \cdot x)]^2}{n(n-1)}}$$ standard deviation for frequency distribution

Daily Low Temp (°F)	30 − 34	35 − 39	40 − 44	45 − 49	50 − 54	55 − 59 ▭
Frequency	1	4	5	5	4	2

    s = ☐ °F (Round to one decimal place as needed.)

16. Find the (a) mean, (b) median, (c) mode, and (d) midrange for the given sample data.

An experiment was conducted to determine whether a deficiency of carbon dioxide in the soil affects the phenotype of peas. Listed below are the phenotype codes where 1 = smooth-yellow, 2 = smooth-green, 3 = wrinkled-yellow, and 4 = wrinkled-green. Do the results make sense?

| 4 | 2 | 2 | 4 | 4 | 4 | 2 | 2 | 3 | 4 | 4 | 1 | 1 | 1 | 🗇 |

(a) The mean phenotype code is ☐ .
(Round to the nearest tenth as needed.)

(b) The median phenotype code is ☐ .
(Type an integer or a decimal.)

(c) Select the correct choice below and fill in any answer boxes within your choice.

○A. The mode phenotype code is ▉ .
  (Use a comma to separate answers as needed.)

○B. There is no mode.

(d) The midrange of the phenotype codes is ☐ .
(Type an integer or a decimal.)

Do the measures of center make sense?

○A. All the measures of center make sense since the data is numerical.

○B. Only the mode makes sense since the data is nominal.

○C. Only the mean, median, and midrange make sense since the data is nominal.

○D. Only the mean, median, and mode make sense since the data is numerical.

17. The data below indicate the body mass index (BMI) values of 20 males. Find the 5-number summary and construct a boxplot.

     21.5 26.9 32.0 26.7 32.6 30.4 27.9 23.8 26.1 24.0 🗇
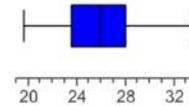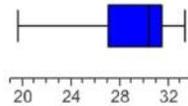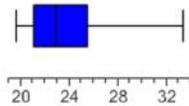   23.3 22.6 28.2 24.5 27.3 25.7 20.8 19.6 33.4 25.1

The 5-number summary is ☐, ☐, ☐, ☐, ☐.
(Type exact answers. Use ascending order.)

Choose the correct boxplot of the data below.

○A.   ○B.   ○C.

18. Listed below are costs (in dollars) of roundtrip flights between two cities. All flights involve one stop and a two-week stay. Find the coefficient of variation for each of the two sets of data, then compare the variation.

     30 Days in Advance: 257 303 259 314 252   266   257 🗇
       1 Day in Advance: 458 630 551 932 630 1036 576

The coefficient of variation for the prices of tickets purchased 30 days in advance is ☐ %.(Round to three decimal places as needed.)

The coefficient of variation for the prices of tickets purchased 1 day in advance is ☐ %.(Round to three decimal places as needed.)

Is there a difference in variation between the two data sets?

○A. The costs of tickets purchased 30 days in advance have less variation than the costs of tickets purchased 1 day in advance.

○B. The costs of tickets purchased 1 day in advance have less variation than the costs of tickets purchased 30 days in advance.

○C. There is no significant difference in the variation.

19. The mean of electrical energy consumption amounts for a home during a two-month period is 3111 kWh, and the standard deviation is 583 kWh. Use the range rule of thumb to identify minimum and maximum "usual" amounts of electrical energy consumption. For one particular two-month period, the power company recorded consumption of 1995 kWh. Is that amount unusual?

minimum "usual" value = ☐ kWh

maximum "usual" value = ☐ kWh

Is 1995 kWh an unusual amount of consumption?

○ A. Yes, because it is larger than the maximum usual value.

○ B. No, because it is between the minimum and maximum usual values.

○ C. Yes, because it is smaller than the minimum usual value.

○ D. Yes, because it is between the minimum and maximum values.

20. The systolic blood pressures of 40 women have a mean of 110.8 mm Hg and a standard deviation of 17.1 mm Hg. The highest systolic blood pressure measurement in this sample is 181 mm Hg. In this context, is a systolic blood pressure of 181 mm Hg "unusual"? Why or why not?

Choose the correct answer below.

○ A. No, because it does not differ from the mean by more than two standard deviations.

○ B. No, because it does not differ from the mean by more than one standard deviation.

○ C. Yes, because it differs from the mean by more than one standard deviation.

○ D. Yes, because it differs from the mean by more than two standard deviations.

21. Find the mean of the data summarized in the given frequency distribution. Compare the computed mean to the actual mean of 46.9 miles per hour.

Speed (miles per hour)	42 – 45	46 – 49	50 – 53	54 – 57	58 – 61
Frequency	21	12	6	3	2

The mean of the frequency distribution is ☐ miles per hour.
(Round to the nearest tenth as needed.)

Which of the following best discribes the relationship between the computed mean and the actual mean?

○A. The computed mean is close to the actual mean because the difference between the means is less than 5%.

○B. The computed mean is not close to the actual mean because the difference between the means is less than 5%.

○C. The computed mean is not close to the actual mean because the difference between the means is more than 5%.

○D. The computed mean is close to the actual mean because the difference between the means is more than 5%.

22. Find the (a) mean, (b) median, (c) mode, and (d) midrange for the given sample data.

Fourteen different second-year medical students measured the blood pressure of the same person. The systolic readings (in mmHg) are listed below.

141   122   144   147   131   138   143   131   134   122   126   141   131   131

(a) The mean blood pressure reading is ☐ mmHg.
(Round to the nearest tenth as needed.)

(b) The median blood pressure reading is ☐ mmHg.
(Round to the nearest tenth as needed.)

(c) Select the correct choice below and fill in any answer boxes within your choice.

○A. The mode blood pressure reading is ☐ mmHg.
(Use a comma to separate answers as needed.)

○B. There is no mode.

(d) The midrange of the data set is ☐ mmHg.
(Round to the nearest tenth as needed.)

23. A particular group of men have heights with a mean of 176 cm and a standard deviation of 7 cm. Charley had a height of 188 cm.

   a. What is the difference between Charley's height and the mean?

   b. How many standard deviations is that [the difference found in part (a)]?

   c. Convert Charley's height to a z score.

   d. If we consider "usual" heights to be those that convert to z scores between -2 and 2, is Charley's height usual or unusual?

---

a. The difference between Charley's height and the mean is ☐ cm.

b. The difference is ☐ standard deviations.
(Type an integer or decimal rounded to two decimal places as needed.)

c. The z score is ☐ .
(Type an integer or decimal rounded to two decimal places as needed.)

d. Is Charley's height usual or unusual?

   ○   Usual

   ○   Unusual

---

24. Listed below are the errors between the predicted temperatures and actual temperatures of a certain city. Find the mean and median for each of the two samples. Do the means and medians indicate that the temperatures predicted one day in advance are more accurate than those predicted 5 days in advance, as we might expect?

(actual high) − (predicted high 1 day earlier)	0	0	0	0	2	0	0	1	0	0
(actual high) − (predicted high 5 days earlier)	− 3	− 1	− 1	− 1	6	− 2	− 5	− 2	5	− 1

The mean difference between actual high and the predicted high one day earlier is
☐°.
(Type an integer or decimal rounded to the nearest tenth as needed.)

The median difference between actual high and the predicted high one day earlier is
☐°.
(Type an integer or decimal rounded to the nearest tenth as needed.)

The mean difference between actual high and the predicted high five days earlier is
☐°.
(Type an integer or decimal rounded to the nearest tenth as needed.)

The median difference between actual high and the predicted high five days earlier is
☐°.
(Type an integer or decimal rounded to the nearest tenth as needed.)

Do the means and medians indicate that the temperatures predicted one day in advance are more accurate than those predicted 5 days in advance, as we might expect?

○ A. No, the means and medians do not indicate any substantial difference in accuracy.

○ B. Yes, the means and medians indicate that predictions made one day in advance are more accurate.

○ C. No, the means and medians indicate that predictions made five days in advance are more accurate.

25. Listed below are the playing times (in seconds) of 16 popular songs. Find the range, variance, and standard deviation for the set of data. Does the standard deviation change much if the longest playing time is deleted?

448 270 209 216 213 283 280 276 230 229 268 246 257 210 285 286 🗔

The range of the sample data is ☐ seconds. (Type an integer or a decimal.)

The variance of the sample data is ☐ .
(Round to three decimal places as needed.)

The standard deviation of the sample data is ☐ seconds.
(Round to three decimal places as needed.)

Does the standard deviation change much if the longest playing time is deleted?

○   No

○   Yes

1. 18.138
  30.134
  C

2. 721.5
  730.6
  736
  A

3. C

4. 27,998
  26,163
  B
  28,259

5. 2.92
  B

6. 6,402.60
  6,430.00
  B
  6,612.50
  B

7. 75
  144
  168

8. 1327
  1513
  1910
  2051
  2487
  A

9. 380
  11,171.781
  105.697
  C

10. B

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11.   7.08
            7.1
            7.08
            7.1
            B

12.   36

13.   25
            80.8
            9.0
            C

14.   57

15.   7

16.   2.7
            2.5
            A, 4
            2.5
            B

17.   19.6
            23.55
            25.9
            28.05
            33.4
            C

18.   9.206
            30.942
            A

19.   1945
            4277
            B

20.   D

21.   47.2
            A

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22. 134.4
     132.5
     A, 131
     134.5

23. 12
     1.71
     1.71
     the first choice

24. 0.3
     0
     -0.5
     -1
     A

25. 239
     3,278.250
     57.256
     the second choice