

1. 0.45/0.45 points | [Previous Answers](#)BBUnderStat12 1.1.009.

Government agencies carefully monitor water quality and its effect on wetlands (Reference: *Environmental Protection Agency Wetland Report* EPA 832-R-93-005). Of particular concern is the concentration of nitrogen in water draining from fertilized lands. Too much nitrogen can kill fish and wildlife. Twenty-eight samples of water were taken at random from a lake. The nitrogen concentration (milligrams of nitrogen per liter of water) was determined for each sample.

(a) Identify the variable.

- nitrogen concentration in the entire lake
- amount of water
- the 28 samples
- nitrogen concentration



(b) Is the variable quantitative or qualitative?

- quantitative
- qualitative
- neither quantitative nor qualitative
- both quantitative and qualitative



(c) What is the implied population?

- all lakes
- the entire lake
- all the fish in the lake
- the 28 samples that were examined




Need Help?

Read It

Categorize these measurements associated with a robotics company according to level: nominal, ordinal, interval, or ratio.


(a) Salesperson's performance: below average, average, above average.

nominal
 ordinal
 interval
 ratio




(b) Price of company's stock

nominal
 ordinal
 interval
 ratio




(c) Names of new products

nominal
 ordinal
 interval
 ratio




(d) Temperature (°F) in CEO's private office

nominal
 ordinal
 interval
 ratio




(e) Gross income for each of the past 5 years

nominal
 ordinal
 interval
 ratio



(f) Color of product packaging

nominal
 ordinal
 interval
 ratio



Need Help?

[Read It](#)

[Watch It](#)

An important part of employee compensation is a benefits package, which might include health insurance, life insurance, child care, vacation days, retirement plan, parental leave, bonuses, etc. Suppose you want to conduct a survey of benefits packages available in private businesses in Hawaii. You want a sample size of 100. Some sampling techniques are described below. Categorize each technique as *simple random sample*, *stratified sample*, *systematic sample*, *cluster sample*, or *convenience sample*.

(a) Assign each business in the Island Business Directory a number, and then use a random-number table to select the businesses to be included in the sample.

- simple random sample
- stratified sample
- systematic sample
- cluster sample
- convenience sample



(b) Use postal ZIP Codes to divide the state into regions. Pick a random sample of 10 ZIP Code areas and then include all the businesses in each selected ZIP Code area.

- simple random sample
- stratified sample
- systematic sample
- cluster sample
- convenience sample



(c) Send a team of five research assistants to Bishop Street in downtown Honolulu. Let each assistant select a block or building and interview an employee from each business found. Each researcher can have the rest of the day off after getting responses from 20 different businesses.

- simple random sample
- stratified sample
- systematic sample
- cluster sample
- convenience sample



(d) Use the Island Business Directory. Number all the businesses. Select a starting place at random, and then use every 50th business listed until you have 100 businesses.

- simple random sample
- stratified sample
- systematic sample
- cluster sample
- convenience sample



(e) Group the businesses according to type: medical, shipping, retail, manufacturing, financial, construction, restaurant, hotel, tourism, other. Then select a random sample of 10 businesses from each business type.

- simple random sample
- stratified sample
- systematic sample
- cluster sample
- convenience sample



Need Help?

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Watch It

The following data represent glucose blood levels (mg/100 ml) after a 12-hour fast for a random sample of 70 women (Reference: *American Journal of Clinical Nutrition*, Vol. 19, pp. 345-351).

45 66 83 71 76 64 59 59 76 82
 80 81 85 77 82 90 87 72 79 69
 83 71 87 69 81 76 96 83 67 94
 101 94 89 94 73 99 93 85 83 80
 78 80 85 83 84 74 81 70 65 89
 70 80 84 77 65 46 80 70 75 45
 101 71 109 73 73 80 72 81 63 74

For this problem, use six classes.

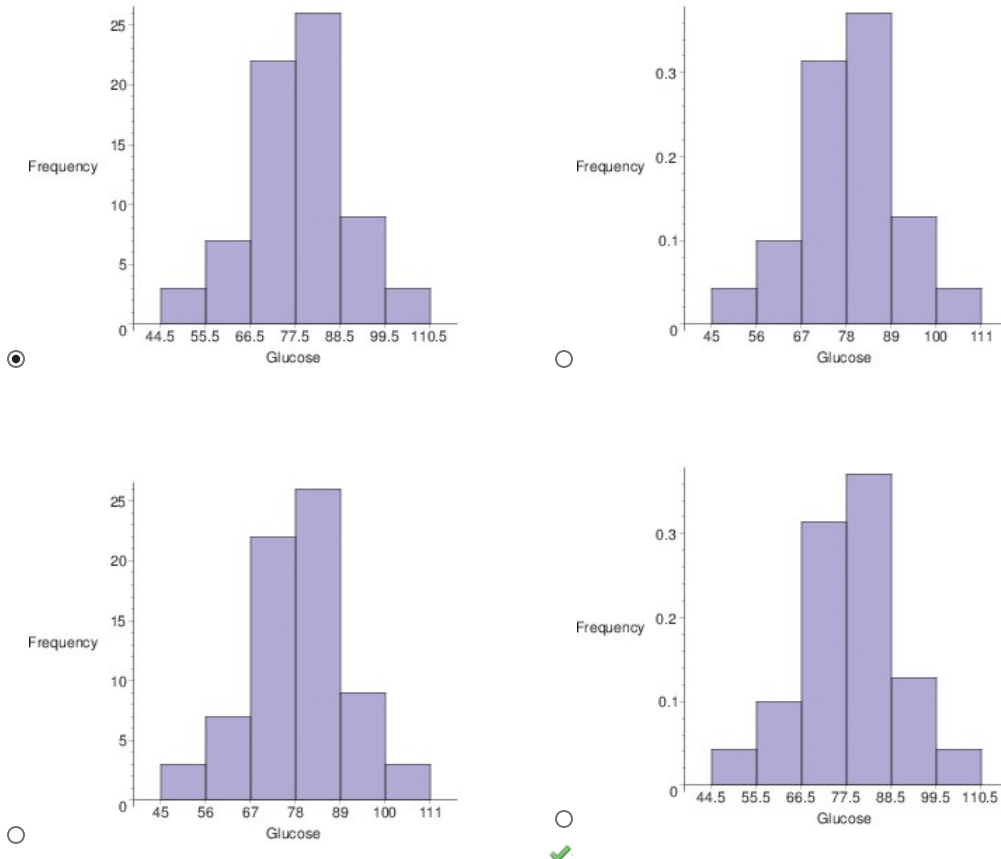
(a) Find the class width.

✓

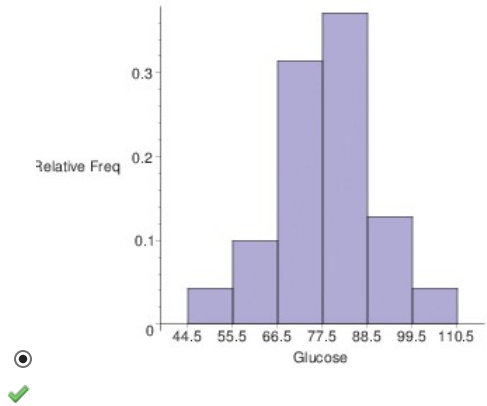
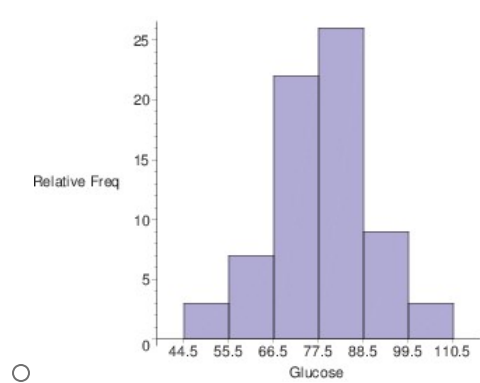
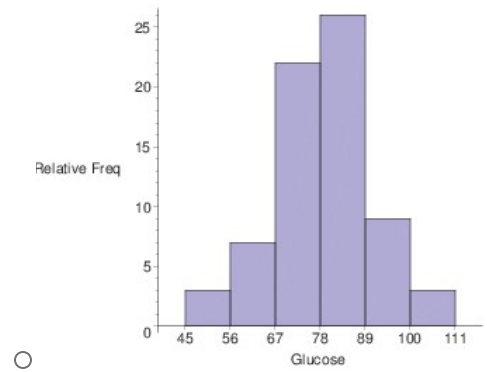
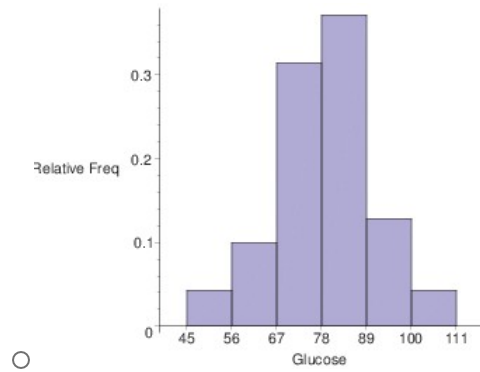
(b) Make a frequency table showing class limits, class boundaries, midpoints, frequencies, relative frequencies, and cumulative frequencies. (Give relative frequencies to 4 decimal places.)

Class Limits		Class Boundaries		Midpoint	Frequency	Relative Frequency	Cumulative Frequency
45	✓ - 55	✓ 44.5	✓ - 55.5	✓ 50	✓ 3	✓ .0429	✓ 3
56	✓ - 66	✓ 55.5	✓ - 66.5	✓ 61	✓ 7	✓ .1000	✓ 10
67	✓ - 77	✓ 66.5	✓ - 77.5	✓ 72	✓ 22	✓ .3143	✓ 32
78	✓ - 88	✓ 77.5	✓ - 88.5	✓ 83	✓ 26	✓ .3714	✓ 58
89	✓ - 99	✓ 88.5	✓ - 99.5	✓ 94	✓ 9	✓ .1286	✓ 67
100	✓ - 110	✓ 99.5	✓ - 110.5	✓ 105	✓ 3	✓ .0429	✓ 70

(c) Draw a histogram.



(d) Draw a relative-frequency histogram.



(e) Categorize the basic distribution shape.

- skewed left
 - mound-shaped symmetrical
 - skewed right
 - bimodal
 - uniform
- ✓

(f) Draw an ogive. (Graph each point and the closed line segments connecting the points to create your graph.)

The image shows the WebAssign graphing tool interface. It features a central graph with a grid. The x-axis has labels 44, 55, 66, 77, 88, 99, and 110. The y-axis has labels 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, and 70. A black line connects seven data points at approximately (44, 2), (55, 4), (66, 10), (77, 32), (88, 58), (99, 67), and (110, 70). The interface includes several toolbars:

- Tools:** Contains icons for a mouse cursor, a selection tool, a circle, a parabola, a point, and a "No Solution" button.
- Actions:** Contains buttons for "Clear All", "Delete", and "Fill".
- Object Properties:** A text box with the prompt "Select a Tool or Object to Begin" and a "Correct" button with a green checkmark.
- Help:** A button with a question mark icon.

At the bottom of the interface, the text "WebAssign graphing tool" is visible. Below the interface, there is a blue link labeled "Submission Data" and a green checkmark.

x	y
44	2
55	4
66	10
77	32
88	58
99	67
110	70

Need Help? [Read It](#)

The American Medical Association Center for Health Policy Research included data, by state, on the number of community hospitals and the average patient stay (in days) in its publication *State Health Care Data: Utilization, Spending, and Characteristics*. The data (by state) are shown in the table.

State	No. of Hospitals	Average Length of Stay	State	No. of Hospitals	Average Length of Stay	State	No. of Hospitals	Average Length of Stay
Alabama	119	7.0	Kentucky	107	6.9	N. Dakota	47	11.1
Alaska	16	5.7	Louisiana	136	6.7	Ohio	193	6.6
Arizona	61	5.5	Maine	38	7.2	Oklahoma	113	6.7
Arkansas	88	7.0	Maryland	51	6.8	Oregon	66	5.3
California	440	6.0	Massachusetts	101	7.0	Pennsylvania	236	7.5
Colorado	71	6.8	Michigan	175	7.3	Rhode Island	12	6.9
Connecticut	35	7.4	Minnesota	148	8.7	S. Carolina	68	7.1
Delaware	8	6.8	Mississippi	102	7.2	S. Dakota	52	10.3
D.C.	11	7.5	Missouri	133	7.4	Tennessee	122	6.8
Florida	227	7.0	Montana	53	10.0	Texas	421	6.2
Georgia	162	7.2	Nebraska	90	9.6	Utah	42	5.2
Hawaii	19	9.4	Nevada	21	6.4	Vermont	15	7.6
Idaho	41	7.1	New Hampshire	27	7.0	Virginia	98	7.0
Illinois	209	7.3	New Jersey	96	7.6	Washington	92	5.6
Indiana	113	6.6	New Mexico	37	5.5	W. Virginia	59	7.1
Iowa	123	8.4	New York	231	9.9	Wisconsin	129	7.3
Kansas	133	7.8	N. Carolina	117	7.3	Wyoming	27	8.5

Make a stem-and-leaf display of the data for the average length of stay in days. (Use the digit(s) to the left of the decimal point as the stem and the digit to the right as the leaf. Enter NONE in any unused answer blanks.)

235567	✓
0246677888899	✓
00000011122233334455668	✓
457	✓
469	✓
03	✓
1	✓

Comment about the general shape of the distribution.

- The distribution is skewed right.
- The distribution is bimodal.
- The distribution is uniform.
- The distribution is skewed left.

Need Help? [Read It](#)


6. 0.45/0.45 points | [Previous Answers](#)BBUnderStat12 3.1.028.

Where does all the water go? According to the Environmental Protection Agency (EPA), in a typical wetland environment, 35% of the water is outflow; 46% is seepage; 7% evaporates; and 12% remains as water volume in the ecosystem (Reference: United States Environmental Protection Agency Case Studies Report 832-R-93-005). Chloride compounds as residuals from residential areas are a problem for wetlands. Suppose that in a particular wetland environment the following concentrations (mg/l) of chloride compounds were found: outflow, 70.6; seepage, 74.7; remaining due to evaporation, 34.9; in the water volume, 62.1.

(a) Compute the weighted average of chlorine compound concentration (mg/l) for this ecological system. (Round your answer to one decimal place.)

 mg/l

(b) Suppose the EPA has established an average chlorine compound concentration target of no more than 58 mg/l. Does this wetlands system meet the target standard for chlorine compound concentration?


- Yes. The average chlorine compound concentration (mg/l) is too high.
 - Yes. The average chlorine compound concentration (mg/l) is lower than the target.
 - No. The average chlorine compound concentration (mg/l) is lower than the target.
 - No. The average chlorine compound concentration (mg/l) is too high.
- 

Need Help?


[Read It](#)

7. 0.45/0.45 points | [Previous Answers](#)BBUnderStat12 2.R.004.

How are dotplots and stem-and-leaf displays similar?

- Dotplots and stem-and-leaf displays both show changes over time.
 - Neither dotplots nor stem-and-leaf displays show every data value.
 - Dotplots and stem-and-leaf displays both show every data value.
 - Dotplots and stem-and-leaf displays both group data points into categories.
- 

How are they different?

- Dotplots group data points into categories, whereas stem-and-leaf displays show each individual value.
 - Stem-and-leaf displays show changes over time, whereas dotplots do not.
 - Dotplots show every data value, whereas stem-and-leaf displays group data into categories.
 - Stem-and-leaf displays group the data with the same stem, whereas dotplots only group the data with identical values.
- 

Need Help?

[Read It](#)

You are conducting a study of students doing work-study jobs on your campus. Among the questions on the survey instrument are the following.

A. How many hours are you scheduled to work each week? Answer to the nearest hour.

B. How applicable is this work experience to your future employment goals?

Respond using the following scale: 1= not at all, 2 = somewhat, 3 = very

(a) Suppose you take random samples from the following groups: freshmen, sophomores, juniors, and seniors. What kind of sampling technique are you using (simple random, stratified, systematic, cluster, multistage, convenience)?

- systematic sample
- simple random sample
- multistage sample
- stratified sample
- convenience sample
- cluster sample



(b) Describe the individuals of this study.

- Students on your campus.
- Students on your campus with work-study jobs.
- Students on all campuses with work-study jobs.
- Students on all campuses.



(c) What is the variable for question A?

- hours scheduled
- total hours worked
- number of students who work
- type of job



Classify the variable as qualitative or quantitative.

- neither quantitative nor qualitative
- both qualitative and quantitative
- quantitative
- qualitative



What is the level of measurement?

- interval
- nominal
- ratio
- ordinal



(d) What is the variable for question B?

- number of students who work
- hours scheduled
- rating of satisfaction of work experience for future employment
- rating of applicability of work experience to future employment



Classify the variable as qualitative or quantitative.

- both qualitative and quantitative
- neither quantitative nor qualitative
- qualitative
- quantitative



What is the level of measurement?

- nominal
- ordinal
- interval
- ratio



(e) Is the proportion of responses "3 = very" to question B a statistic or a parameter?

- parameter
- statistic
- both a parameter and a statistic
- neither a statistic nor a parameter



(f) Suppose only 40% of the students you selected for the sample respond. What is the nonresponse rate?

%



Do you think the nonresponse rate might introduce bias into the study? Explain.

- No, the people choosing to respond probably don't have characteristics that would bias the study.
- Yes, the people choosing not to respond may have some characteristics that would bias the study.
- Yes, the people choosing to respond may have some characteristics that would bias the study.
- No, the people choosing not to respond probably don't have characteristics that would bias the study.



(g) Would it be appropriate to generalize the results of your study to all work-study students in the nation? Explain.

- No, results only apply to the students sampled.
- Yes, the sample is random so the results can be applied anywhere.
- No, the sample frame is restricted to one campus.
- Yes, the sample frame is for all campuses.




Need Help?


[Read It](#)

Categorize the type of sampling (simple random, stratified, systematic, cluster, or convenience) used in each of the following situations.


(a) To conduct a preelection opinion poll on a proposed amendment to the state constitution, a random sample of 10 telephone prefixes (first three digits of the phone number) was selected, and all households from the phone prefixes selected were called.

- simple random sample
 - stratified sample
 - systematic sample
 - cluster sample
 - convenience sample
- 


(b) To conduct a study on depression among the elderly, a sample of 30 patients in one nursing home was used.

- simple random sample
 - stratified sample
 - systematic sample
 - cluster sample
 - convenience sample
- 

(c) To maintain quality control in a brewery, every 20th bottle of beer coming off the production line was opened and tested.

- simple random sample
 - stratified sample
 - systematic sample
 - cluster sample
 - convenience sample
- 

(d) Subscribers to a new smart phone app that streams songs were assigned numbers. Then a sample of 30 subscribers was selected by using a random-number table. The subscribers in the sample were invited to rate the process for selecting the songs in the playlist.

- simple random sample
 - stratified sample
 - systematic sample
 - cluster sample
 - convenience sample
- 

(e) To judge the appeal of a proposed television sitcom, a random sample of 10 people from each of three different age categories was selected and those chosen were asked to rate a pilot show.

- simple random sample
- stratified sample
- systematic sample
- cluster sample
- convenience sample



Need Help?

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10.0.45/0.45 points | [Previous Answers](#)BBUnderStat12 2.R.001.

Consider these types of graphs: histogram, bar graph, Pareto chart, pie chart, stem-and-leaf display.

(a) Which are suitable for qualitative data? (Select all that apply.)

- stem-and-leaf display
- Pareto chart
- bar graph
- histogram
- pie chart



(b) Which are suitable for quantitative data? (Select all that apply.)

- histogram
- stem-and-leaf display
- pie chart
- Pareto chart
- bar graph



Need Help?

Read It

11.0.45/0.45 points | [Previous Answers](#)BBUnderStat12 2.R.003.

Describe how data outliers might be revealed in histograms and stem-and-leaf plots.

- Any large gaps between bars or stems might indicate potential outliers.
- Any large values might indicate potential outliers.
- Large concentrations of data values might indicate potential outliers.
- Any small values might indicate potential outliers.



Need Help?

Read It

Driving under the influence of alcohol (DUI) is a serious offense. The following data give the ages of a random sample of 50 drivers arrested while driving under the influence of alcohol. This distribution is based on the age distribution of DUI arrests given in the *Statistical Abstract of the United States* (112th Edition).

46 16 41 26 22 33 30 22 36 34
 63 21 26 18 27 24 31 38 26 55
 31 47 27 43 35 22 64 40 58 20
 49 37 53 25 29 32 23 49 39 40
 24 56 30 51 21 45 27 34 47 35

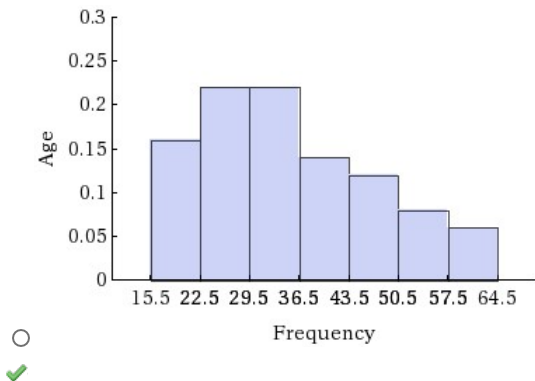
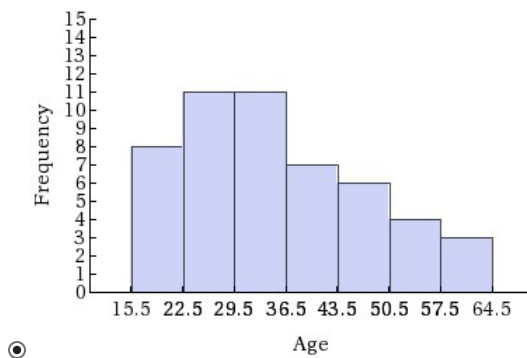
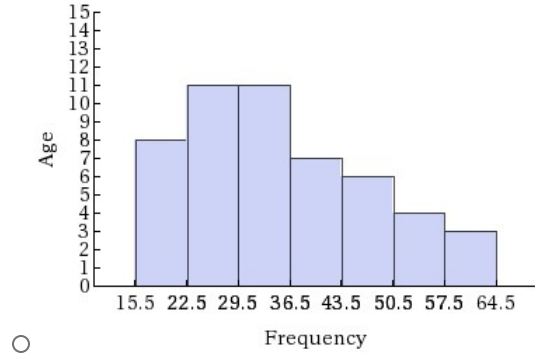
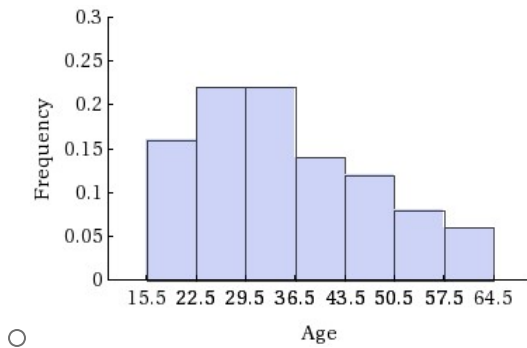
(a) Make a stem-and-leaf display of the age distribution. (Use the tens digit as the stem and the ones digit as the leaf. Enter numbers from smallest to largest separated by spaces. Enter NONE for stems with no values.)

68	✓
01122234456667779	✓
00112344556789	✓
0013567799	✓
13568	✓
34	✓

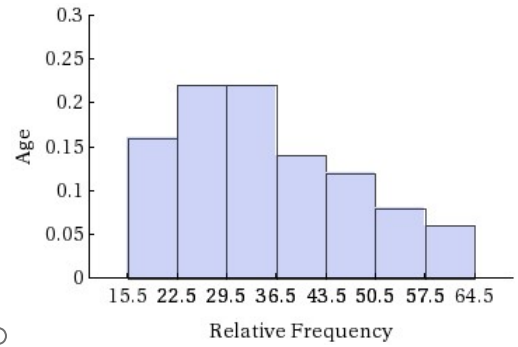
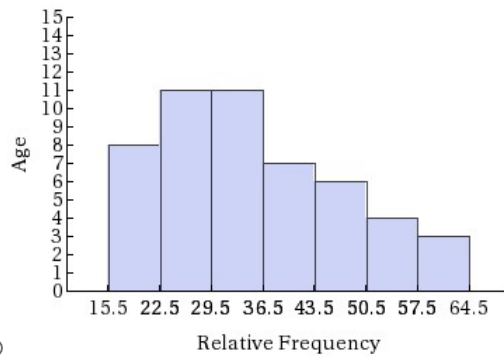
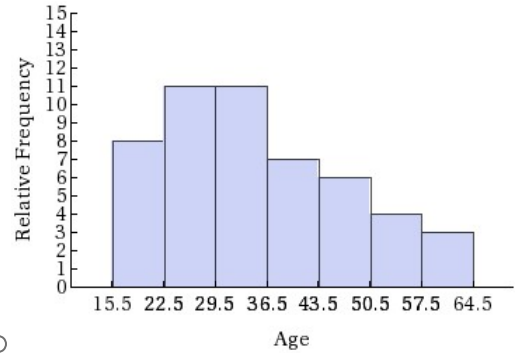
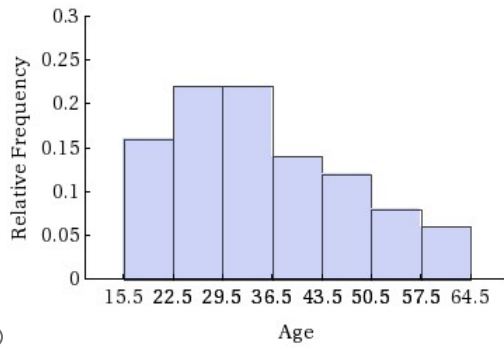
(b) Make a frequency table using seven classes.

Class Limits		Class Boundaries		Midpoint	Frequency	Relative Frequency	Cumulative Frequency
16	✓ - 22	✓ 15.5	✓ - 22.5	✓ 19	✓ 8	✓ .16	✓ 8
23	✓ - 29	✓ 22.5	✓ - 29.5	✓ 26	✓ 11	✓ .22	✓ 19
30	✓ - 36	✓ 29.5	✓ - 36.5	✓ 33	✓ 11	✓ .22	✓ 30
37	✓ - 43	✓ 36.5	✓ - 43.5	✓ 40	✓ 7	✓ .14	✓ 37
44	✓ - 50	✓ 43.5	✓ - 50.5	✓ 47	✓ 6	✓ .12	✓ 43
51	✓ - 57	✓ 50.5	✓ - 57.5	✓ 54	✓ 4	✓ .08	✓ 47
58	✓ - 64	✓ 57.5	✓ - 64.5	✓ 61	✓ 3	✓ .06	✓ 50

(c) Make a histogram showing class boundaries.



(d) Draw a relative frequency histogram.




(e) Identify the shape of the distribution.

- skewed right
- bimodal
- uniform
- skewed left




(f) Draw an ogive. (Graph each point and the closed line segments connecting the points to create your graph.)

[Submission Data](#)



(g) Discuss how this data might be used to price auto insurance for different age groups.

- The data shows the highest prevalence of DUI arrests in 30-39 year olds, so this group may be priced higher to take this into account.
 - The data shows the highest prevalence of DUI arrests in 40-49 year olds, so this group may be priced higher to take this into account.
 - The data shows the highest prevalence of DUI arrests in 50-59 year olds, so this group may be priced higher to take this into account.
 - The data shows the highest prevalence of DUI arrests in 60-69 year olds, so this group may be priced higher to take this into account.
 - The data shows the highest prevalence of DUI arrests in 20-29 year olds, so this group may be priced higher to take this into account.
- 

Need Help?

Read It

Describe how the presence of possible outliers might be identified on the following.

(a) histograms

- gap around the center of the histogram
- higher far left or right bar than surrounding bars
- higher center bar than surrounding bars
- gap between the first bar and the rest of bars or between the last bar and the rest of bars
- large group of bars to the left or right of a gap



(b) dotplots

- large gap between data on the far left side or the far right side and the rest of the data
- large groups of data to the left or right of a gap
- large group of data in the center of the dotplot
- large group of data on the left or right of the dotplot
- large gap around the center of the data



(c) stem-and-leaf displays

- several empty stems after stem including the lowest values or before stem including the highest values
- large group of data near a gap
- several empty stems in the center of the stem-and-leaf display
- large group of data in the center stems
- large group of data in stems on one of the far sides of the stem-and-leaf display



(d) box-and-whisker plots

- data within the fences placed at $Q_1 - 2(IQR)$ and at $Q_3 + 2(IQR)$
- data beyond the fences placed at $Q_1 - 1(IQR)$ and at $Q_3 + 1(IQR)$
- data beyond the fences placed at $Q_1 - 1.5(IQR)$ and at $Q_3 + 1.5(IQR)$
- data beyond the fences placed at $Q_1 - 2(IQR)$ and at $Q_3 + 2(IQR)$
- data within the fences placed at $Q_1 - 1.5(IQR)$ and at $Q_3 + 1.5(IQR)$



Need Help?

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14.0.45/0.45 points | [Previous Answers](#)BBUnderStat12 3.TB.089.

Compute the variance and standard deviation for the following population of scores.

1, 9, 8, 5, 7

$\sigma^2 =$ ✓

$\sigma =$ ✓

Need Help?

15.0.45/0.45 points | [Previous Answers](#)BBUnderStat12 3.TB.088.

Calculate the variance and standard deviation for the following sample of scores:

7, 2, 4, 6, 4, 7, 3, 7

s^2 ✓

s ✓

Need Help?

Consider the following ordered data.

2 5 5 6 7 7 8 9 10

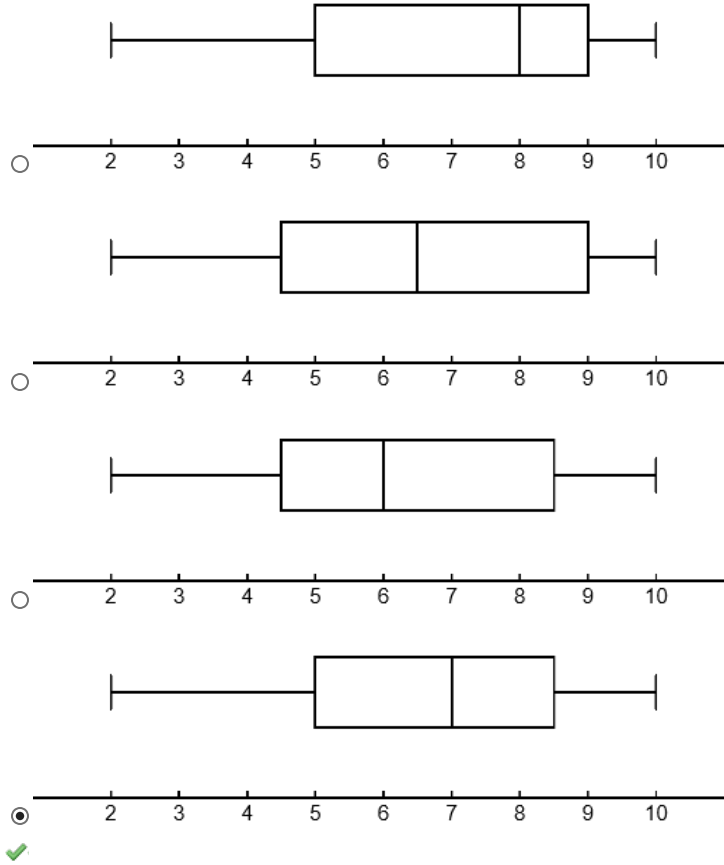
(a) Find the low, Q_1 , median, Q_3 , and high.

- low ✓
- Q_1 ✓
- median ✓
- Q_3 ✓
- high ✓

(b) Find the interquartile range.

✓

(c) Make a box-and-whisker plot.



Need Help?

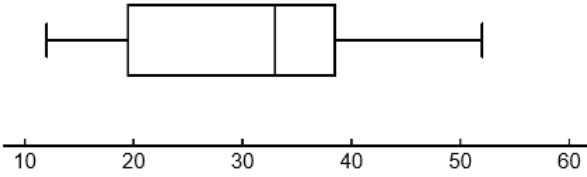
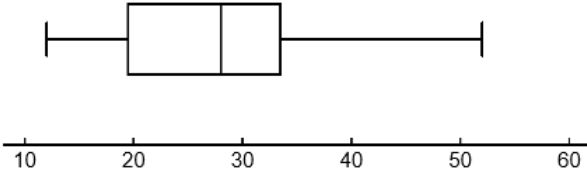
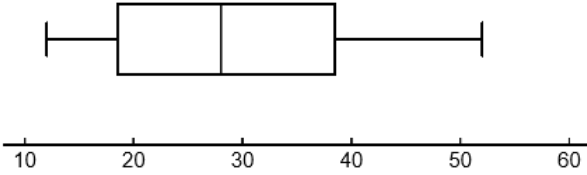
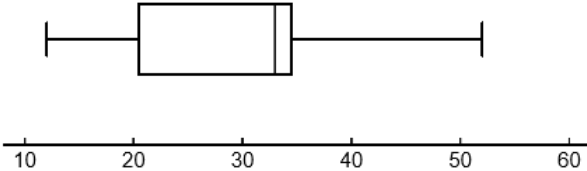
[Read It](#)

[Master It](#)

At one hospital there is some concern about the high turnover of nurses. A survey was done to determine how long (in months) nurses had been in their current positions. The responses (in months) of 20 nurses were as follows.

33 12 15 24 35 46 37 52 22 18
17 33 39 36 38 21 30 41 18 46

Make a box-and-whisker plot of the data.

- 
- 
- 
- 



Find the interquartile range.

19

Need Help?

[Read It](#)

[Master It](#)

Consider the data set.

2, 3, 5, 8, 9

(a) Find the range.

✓

(b) Use the defining formula to compute the sample standard deviation s . (Round your answer to two decimal places.)

✓

(c) Use the defining formula to compute the population standard deviation σ . (Round your answer to two decimal places.)

✓

Need Help?

[Read It](#)

[Master It](#)

Each of the following data sets has a mean of $\bar{x} = 10$.

(i) 8 9 10 11 12 (ii) 7 9 10 11 13 (iii) 7 8 10 12 13

(a) Without doing any computations, order the data sets according to increasing value of standard deviations.

- (i), (iii), (ii)
- (ii), (i), (iii)
- (iii), (i), (ii)
- (iii), (ii), (i)
- (i), (ii), (iii)
- (ii), (iii), (i)



(b) Why do you expect the difference in standard deviations between data sets (i) and (ii) to be greater than the difference in standard deviations between data sets (ii) and (iii)? *Hint:* Consider how much the data in the respective sets differ from the mean.

- The data change between data sets (i) and (ii) increased the squared difference $\Sigma(x - \bar{x})^2$ by more than data sets (ii) and (iii).
- The data change between data sets (ii) and (iii) increased the squared difference $\Sigma(x - \bar{x})^2$ by more than data sets (i) and (ii).
- The data change between data sets (i) and (ii) decreased the squared difference $\Sigma(x - \bar{x})^2$ by more than data sets (ii) and (iii).
- none of the above



Need Help?

[Read It](#)

20.0.45/0.45 points | [Previous Answers](#)BBUnderStat12 3.1.005.MI.

Find the mean, median, and mode of the data set.

9 6 8 6 7

mean ✓

median ✓

mode ✓

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21.0.45/0.45 points | [Previous Answers](#)BBUnderStat12 3.1.007.MI.

Find the mean, median, and mode of the data set.

8 2 7 2 5 3

mean ✓

median ✓

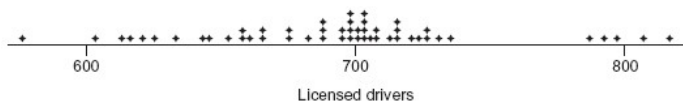
mode ✓

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22.0.55/0.55 points | [Previous Answers](#)BBUnderStat12 2.1.023.

Another display technique that is somewhat similar to a histogram is a *dotplot*. In a dotplot, the data values are displayed along the horizontal axis. A dot is then plotted over each data value in the data set. For more details, view [How to Make a Dotplot](#). The figure below shows a dotplot generated by Minitab for the number of licensed drivers per 1000 residents by state, including the District of Columbia (Source: U.S. Department of Transportation).

Dotplot for Licensed Drivers per 1000 Residents



(a) From the dotplot, how many states have 600 or fewer licensed drivers per 1000 residents?

✓

(b) About what percentage of the states (out of 51) seem to have close to 800 licensed drivers per 1000 residents? (Round your answer to one decimal place.)

✓ %

(c) Consider the intervals 550 to 650, 650 to 750, and 750 to 850 licensed drivers per 1000 residents. In which interval do most of these states fall?

- 550 to 650
 - 650 to 750
 - 750 to 850
- ✓

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