Test Bank for Intro Stats 6th Edition by De Veaux

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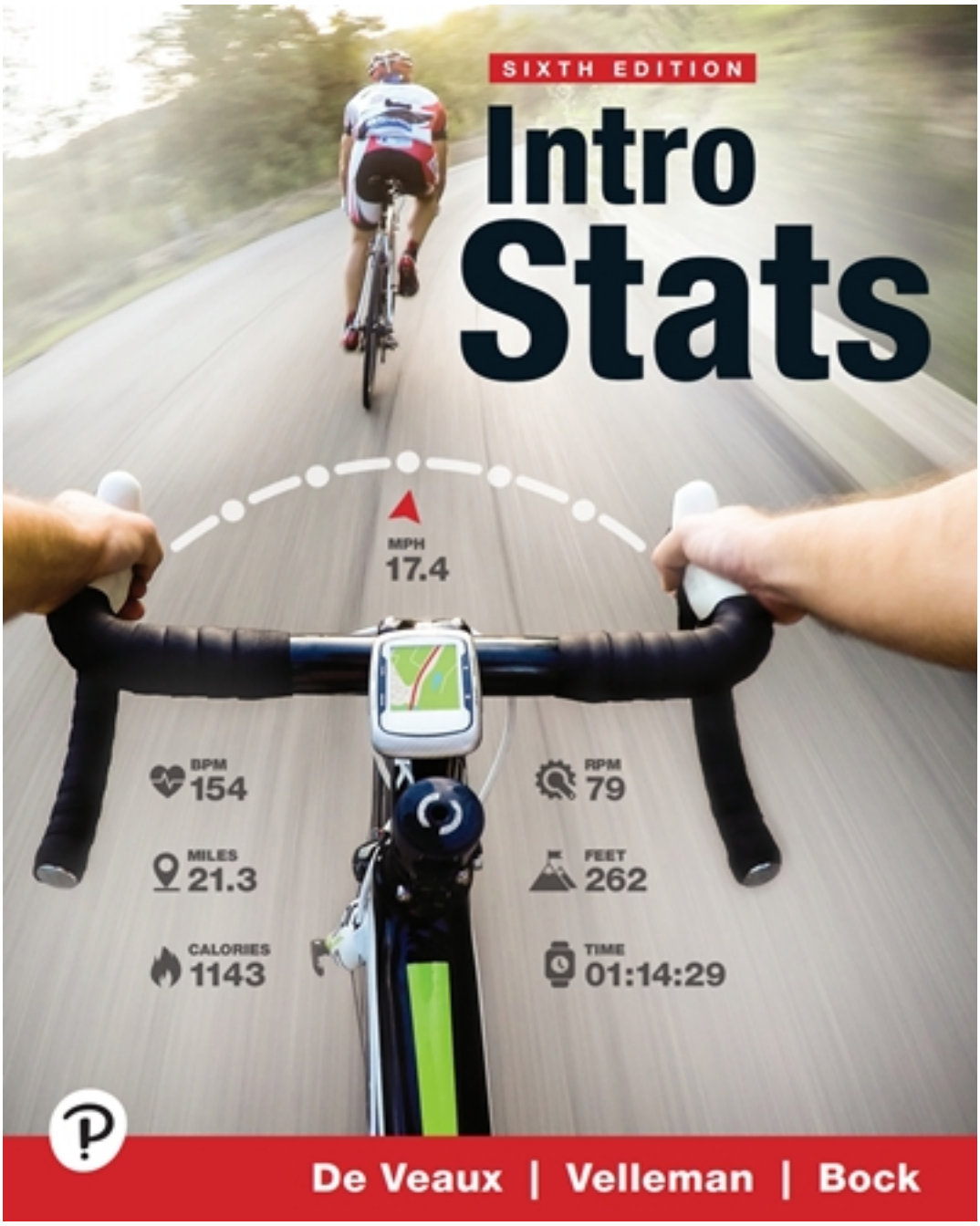


Test Bank

De Veaux *Intro Stats* 6e
Chapter 1 Test

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

1) One of the reasons that the Monitoring the Future (MTF) project was started was "to study changes in the beliefs, attitudes, and behavior of young people in the United States." Data are collected from 8th, 10th, and 12th graders each year. To get a representative nationwide sample, surveys are given to a randomly selected group of students. In Spring 2016, students were asked about alcohol, illegal drug, and cigarette use. Describe the W's, if the information is given. If the information is not given, state that it is not specified.
   - Who:
   - What:
   - When:
   - Where:
   - How:
   - Why:

   Objective: (1) Quiz A

2) Consider the following part of a data set:

Age (years)	Sex	Only child?	Height (inches)	Weight (pounds)	Credit Hours	GPA	Major
21	Female	Yes	67.00	140.0	16	3.60	animal science
20	Female	No	62.00	130.0	18	3.86	biology
28	Female	No	64.00	188.0	21	3.25	psychology
21	Male	No	65.00	140.0	15	2.95	psychology
24	Female	No	67.00	130.0	20	3.00	anthropology
22	Male	Yes	68.00	135.0	15	2.94	journalism

   List the variables in the data set. Indicate whether each variable is treated as categorical or quantitative in this data set. If the variable is quantitative, state the units.

   Objective: (1) Quiz A

In November 2003 *Discover* published an article on the colonies of ants. They reported some basic information about many species of ants and the results of some discoveries found by myrmecologist Walter Tschinkel of the University of Florida. Information included the scientific name of the ant species, the geographic location, the depth of the nest (in feet), the number of chambers in the nest, and the number of ants in the colony. The article documented how new ant colonies begin, the ant-nest design, and how nests differ in shape, number, size of chambers, and how they are connected, depending on the species. It reported that nest designs include vertical, horizontal, or inclined tunnels for movement and transport of food and ants.

3) Describe the W's, if the information is given:
   - Who:
   - What:
   - When:
   - Where:
   - How:
   - Why:

   Objective: (2) Quiz B

4) List the variables. Indicate whether each variable is categorical or quantitative. If the variable is quantitative, tell the units.

Objective: (2) Quiz B

In May 2017, Wirecutter published an article entitled "The Best True Wireless Headphones So Far" (http://thewirecutter.com/reviews/best-true-wireless-headphones/). They tested 11 "of the most promising true wireless in-ear headphones." Among other things, the article told the brand of each pair of headphones, its price, battery life, audio quality, ease of setup, and other characteristics. The article provides a number of recommendations including best for the money, best for the gym, best for Apple, and best for Android. The author, Lauren Dragan, describes herself as a voice actor with an audio production degree who has spent hundreds of hours testing headphones for Wirecutter.

5) Describe the W's, if the information is given:
- Who:
- What:
- When:
- Where:
- How:
- Why:

Objective: (3) Quiz C

6) List the variables. Indicate whether each variable is categorical or quantitative. If the variable is quantitative, tell the units.

Objective: (3) Quiz C

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

7) In the fall of 2007, the *Pew Internet & Life Project* conducted telephone interviews with a sample of American adults aged 18 and older about online shopping. American adults aged 18 and older constitute the _____ of the study.
A) When B) How C) What D) Where E) Who

Objective: (4) Quiz D

8) A few of the variables for which data were collected in the *Pew Internet & Life Project* study about online shopping include age, gender, income, and number of hours spent shopping online per month. Which of the variables is categorical?
A) Number of hours spent shopping online
B) Gender
C) Income
D) Age
E) None

Objective: (4) Quiz D

9) The *Pew Internet & Life Project* study about online shopping asked respondents to indicate their education level on the following scale: *Less than High School, High School, Some College, College +*. Which of the following statements is (are) TRUE?
A) Education level is ordinal scaled.
B) Education level is nominal scaled.
C) Education level is a categorical variable.
D) Both A and B
E) Both A and C

Objective: (4) Quiz D

10) *Consumer Reports Health* routinely compares drugs in terms of effectiveness and safety. In summer 2008 they reviewed drugs used to treat arthritis. Among the information reported was convenience of use (how many pills required each day) and possible side effects (e.g., dizziness, stomach upset). Convenience of use and possible side effects constitute the _____ of the study.

A) When B) Where C) What D) How E) Who

Objective: (4) Quiz D

11) What is the "Who" in a *Consumer Reports Health* study on the effectiveness and safety of drugs used to treat arthritis?

A) summer 2008
B) testing on drugs
C) convenience of use and possible side effects
D) drugs to treat arthritis currently on the market
E) the United States

Objective: (4) Quiz D

12) A *Consumer Reports Health* study on the effectiveness and safety of arthritis drugs collected data on possible side effects. This is what kind of variable?

A) Quantitative B) Categorical C) Nominal D) Both A and C E) Both B and C

Objective: (4) Quiz D

13) A *Consumer Reports Health* study on arthritis drugs takes into consideration cost. Cost

A) is a nominal variable.
B) is a quantitative variable.
C) is an ordinal variable.
D) is an irrelevant variable.
E) is a categorical variable.

Objective: (4) Quiz D

14) The Human Resources Department of a large corporation maintains records on its employees. Data are maintained of the following variables: *Age, Employment Category, Education, Whether or not the employee participates in a wellness program, and Paycheck benefit deductions.* Which of these variables are categorical?

A) *Employment Category, Education*, and *Whether or not the employee participates in a wellness program*
B) *Education, Whether or not the employee participates in a wellness program*, and *Paycheck benefit deductions*
C) *Age, Employment Category*, and *Education*
D) All of the variables
E) None of the variables

Objective: (4) Quiz D

15) A *Consumer Reports* study on tipping takes into consideration median amount of tipping for service providers. Tipping

A) is an irrelevant variable.
B) is a nominal variable.
C) is a categorical variable.
D) is an ordinal variable.
E) is a quantitative variable.

Objective: (4) Quiz D

16) The Human Resources Department of a large corporation maintains records on its employees. Data are maintained of the following variables: *Age, Employment Category, Education,* and *Whether or not the employee has an advanced degree.* Which of these variables are categorical?
A) *Employment Category and Education*
B) *Age, Employment Category*, and *Education*
C) *Education and Whether or not the employee has an advanced degree*
D) All of the variables
E) None of the variables
Objective: (4) Quiz D

17) A university is interested in gauging student satisfaction in its online MBA program. A survey is designed and administered via the Internet to a sample of students currently active in the program. Which of the following would best describe the cases?
A) Variables
B) Subjects
C) Experimental Units
D) Participants
E) Respondents
Objective: (5) Quiz E

18) In a survey undertaken by a university to gauge student satisfaction in its online MBA program, one question asked students to indicate their employment status (unemployed, employed part-time, employed full-time). Which of the following is TRUE?
A) This variable is quantitative.
B) This variable is categorical.
C) This is an identifier variable.
D) Both A and C.
E) Both B and C.
Objective: (5) Quiz E

19) In a survey undertaken by a university to gauge student satisfaction in its online MBA program, one question asked students to indicate the number of credits they had transferred into the program. Which of the following is TRUE?
A) This variable is transactional.
B) This is an identifier variable.
C) This variable is nominal.
D) This variable is quantitative.
E) This variable is categorical.
Objective: (5) Quiz E

20) Researchers in e-commerce design an experiment to determine what factors are most important to online consumers when completing a transaction via the Internet. Individuals perform tasks on a set of Web sites and record their impressions about various attributes. Which of the following would best describe the cases?
A) Participants
B) Identifiers
C) Respondents
D) Variables
E) Experimental Units
Objective: (5) Quiz E

21) A popular travel magazine regularly reviews hotels worldwide. In a recent issue, it focused on hotels in Hawaii. Among the variables for which it provided data was whether or not the hotel included a spa. This is best described as a
A) ordinal variable.
B) identifier variable.
C) categorical variable.
D) quantitative variable.
E) nominal variable.
Objective: (5) Quiz E

22) A popular travel magazine regularly reviews hotels worldwide. In a recent issue, it focused on hotels in Hawaii. Among the variables for which it provided data was the price range for rooms with an ocean view. Which of the following statements is TRUE?
A) This variable is qualitative and nominal.
B) This variable is quantitative and the units are number of rooms.
C) This variable is qualitative and ordinal.
D) This variable is quantitative and has no units.
E) This variable is quantitative and the units are $.
Objective: (5) Quiz E

23) A mid-priced chain of hotels, *Hometown Suites*, strives to make its guests "feel at home" by providing amenities such as microwaves in every room. Comment cards are used to get feedback on the importance of such amenities by asking guests to rate them using the scale: _____ Essential _____ Important _____ Not Important. These data are
A) qualitative.
B) nominal.
C) ordinal.
D) both A and B.
E) both A and C.
Objective: (5) Quiz E

24) *Businesses* are interested in the work experience of recent graduates from a local business school. Whether or not the graduates have work experience constitutes the _____ of the study.
A) Where B) How C) Who D) What E) When
Objective: (5) Quiz E

25) What is the "What" in a *Consumer Reports Tipping* study on the level of tipping during the current holiday season compared to the last holiday season?
A) amount of tip compared to last year
B) the type of tip
C) the United States
D) whether or not tipped
Objective: (5) Quiz E

26) A *Consumer Reports* survey on the level of tipping for service providers. This is what kind of variable?
A) Ordinal B) Nominal C) Quantitative D) Both A and C E) Both B and C
Objective: (5) Quiz E

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

27) Students in a statistics course were asked to answer a variety of questions. One question asked for students to pick a favorite Superpower. Results are listed to the right.

a. Create a visual display for these data.

Superpower	Num of Students
Fly	19
Freeze Time	11
Invisibility	7
Super strength	4
Telepathy	12

b. Describe the distribution of the students' choices.

Objective: (1) Quiz A

28) Which of the following variables would be appropriate to graph using a pie or bar graph?

a. Annual income for 20 employees Yes or No
b. The favorite baseball team of 30 students Yes or No
c. The number of pages in 15 textbooks Yes or No
d. The country of origin of 25 immigrants Yes or No

Objective: (1) Quiz A

29) Describe why the area principle is important in making a bar graph. It might be fun to ask an artist to liven up a bar graph by turning the bars into images. But include in your explanation why this might be risky.

Objective: (1) Quiz A

30) A survey conducted in a college intro stats class asked students about the number of credit hours they were taking that quarter. The number of credit hours for a random sample of 16 students is given in the table.

10	10	12	14	15	15	15	15
17	17	19	20	20	20	20	22

a. Sketch a histogram of these data.
b. Find the mean and standard deviation for the number of credit hours.
c. Find the median and IQR for the number of credit hours.
d. Is it more appropriate to use the mean and standard deviation or the median and IQR to summarize theses data? Explain.

Objective: (2) Quiz B

31) Suppose that the student taking 22 credit hours in the data set in the previous question was actually taking 28 credit hours instead of 22 (so we would replace the 22 in the data set with 28). Indicate whether changing the number of credit hours for that student would make each of the following summary statistics increase, decrease, or stay about the same:

a. mean
b. median
c. range
d. IQR
e. standard deviation

Objective: (2) Quiz B

32) The students in a biology class kept a record of the height (in centimeters) of plants for a class experiment.

49	67	38	55	62
54	36	41	56	43
48	75	44	60	48
52	48	53	59	32

a. Sketch a histogram for these data.
b. Find the mean and standard deviation of the plant heights.
c. Is it appropriate to use the mean and standard deviation to summarize these data? Explain.
d. Describe the distribution of plant heights.

Objective: (3) Quiz C

33) All students in a physical education class completed a basketball free-throw shooting event and the highest number of shots made was 32. The next day a student who had just transferred into the school completed the event, making 35 shots. Indicate whether adding the new student's score to the rest of the data made each of these summary statistics increase, decrease, or stay about the same:

a. mean
b. median
c. range
d. IQR
e. standard deviation

Objective: (3) Quiz C

34) A brake and muffler shop reported the repair bills, in dollars, for their customers yesterday.

88	283	312	290	172
154	400	381	346	181
203	118	143	252	227
56	192	292	213	422

a. Sketch a histogram for these data.
b. Find the mean and standard deviation of the repair costs.
c. Is it appropriate to use the mean and standard deviation to summarize these data? Explain.
d. Describe the distribution of repair costs.

Objective: (4) Quiz D

35) In a survey of 1,500 millennials (ages 18-34), *Business Insider* asked which services were used to consume video content. Use the data on the right to construct an appropriate display and describe your graph.

Service	Percent
YouTube	81%
Netflix	79%
Hulu	37%
Amazon Prime	34%
HBO	21%
Crackle	12%
None	3%
Other	2%

Objective: (4) Quiz D

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

36) A automobile marketing firm conducts a study to see what types of cars people owned before buying an American car. The results are shown below.

Previous Ownership	Frequency
American	760
Japanese	375
Korean	72
German	37
Other	24
Total	1268

The relative frequency of those who owned Japanese cars previously who now bought American cars is

A) 14.9% B) 5.7% C) 59.9 % D) 2.9% E) 29.6%

Objective: (5) Quiz E

37) A restaurant uses comment cards to get feedback from its customers about newly added items to the menu. It recently introduced homemade organic veggie burgers. Customers who tried the new burger were asked if they would order it again. The data are summarized in the table below. What percentage of customers would definitely order the veggie burger again?

Response	Frequency
Definitely would.	10
Most likely would.	40
Maybe	12
Definitely would not.	3

A) 20% B) 15% C) 77% D) 10% E) 40%

Objective: (5) Quiz E

38) A restaurant uses comment cards to get feedback from its customers about newly added items to the menu. It recently introduced homemade organic veggie burgers. Customers who tried the new burger were asked if they would order it again. The data are summarized in the table below. What percentage of customers would most likely or definitely order the veggie burger again?

Response	Frequency
Definitely would.	10
Most likely would.	40
Maybe	12
Definitely would not.	3

A) 15% B) 50% C) 77% D) 10% E) 40%

Objective: (5) Quiz E

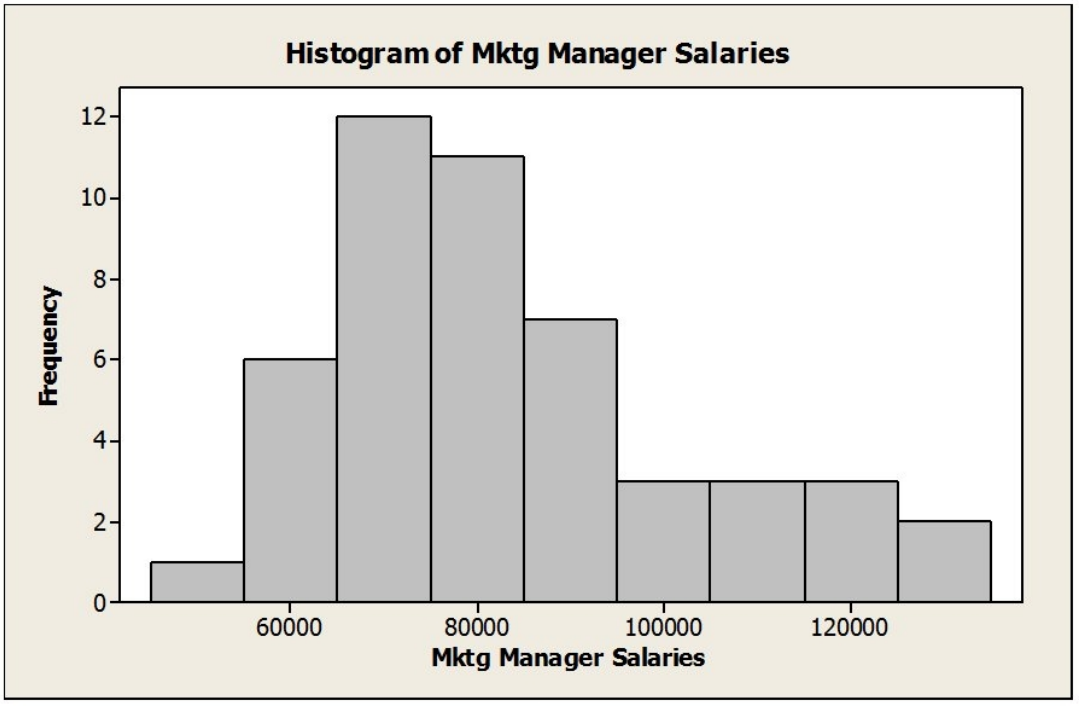
39) A restaurant uses comment cards to get feedback from its customers about newly added items to the menu. It recently introduced homemade organic veggie burgers. Customers who tried the new burger were asked if they would order it again. Which of the following would be an appropriate method for displaying the data shown in the table?

Response	Frequency
Definitely would.	10
Most likely would.	40
Maybe	12
Definitely would not.	3

A) Stem-and-leaf display
B) Pie chart
C) Dotplot
D) Histogram
E) Both C and D

Objective: (5) Quiz E

40) Below is a histogram of salaries (in $) for a sample of U.S. marketing managers.



The shape of this distribution is

A) symmetric. B) right skewed. C) bimodal. D) normal. E) left skewed.

Objective: (5) Quiz E

41) Here is the five number summary for salaries of U.S. marketing managers.

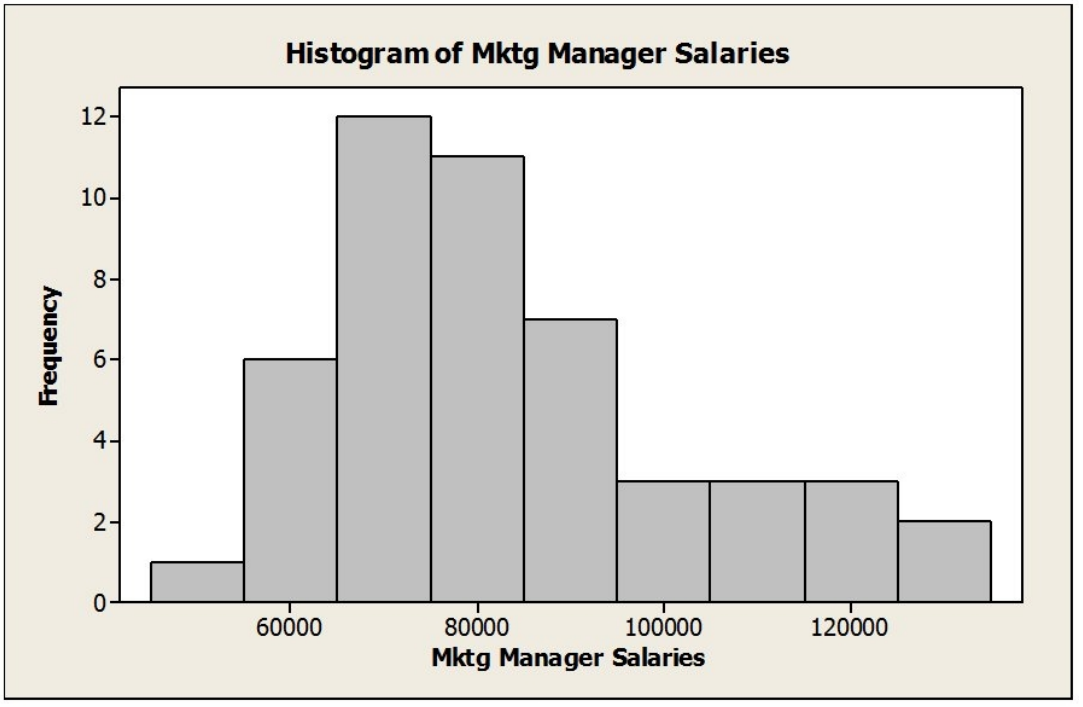
Min	Q1	Median	Q3	Max
46360	69693	77020	91750	129420

The IQR is

A) $14,566. B) $69,693. C) $77.020. D) $83,060. E) $22.057.

Objective: (5) Quiz E

42) Below is a histogram of salaries (in $) for a sample of U.S. marketing managers.



The most appropriate measure of central tendency for these data is the

A) range.
B) standard deviation.
C) median.
D) mode.
E) mean.

Objective: (5) Quiz E

43) Consider the five number summary for salaries of U.S. marketing managers.

Min	Q1	Median	Q3	Max
46360	69693	77020	91750	129420

Suppose the marketing manager who was earning $129,420 got a raise and is now earning $140,000. Which of the following statement is TRUE?

A) The mean would increase.
B) The median would increase.
C) The range would increase.
D) Both A and C
E) All of the above

Objective: (5) Quiz E

44) The following table shows data for total assets ($ billion) for a small sample of U.S. banks (late 2013).

BANK	ASSETS ($ billion)
State Street Bank and Trust	160.5
Discover Bank	63.9
BancWest	72.8
Citizens Bank	130.0
Northern Trust	83.8
Huntington Bank	53.8
Key Bank	91.8
People's United	27.9

The mean for the total assets data ($ billion) is

A) $78.3. B) $85.6. C) $56.3. D) $120.5. E) $42.4.

Objective: (5) Quiz E

45) The following table shows representative recent closing share prices for a small sample of companies based in India in late 2013.

COMPANY	CLOSING SHARE PRICE
20 Microns	30.95
ABC Paper	24.30
Bank of MA	36.20
Photoquip	37.00
Saksoft	67.20
Marg LTD	13.99
Galaxy ENT	10.40
Sonatasoft	68.75
EDynamics	49.95
DB Corp.	287.95

The standard deviation in closing share prices is

A) $67.6. B) $25.8. C) $81.6. D) $36.6. E) $62.7.

Objective: (5) Quiz E

46) A clothing store uses comment cards to get feedback from its customers about newly added items. It recently introduced plus size fashion wear. Customers who purchased the items were asked to fill out an online comment survey giving 10% off the next purchase. The data are summarized in the table below. What percentage of customers were at least satisfied with the item(s) purchased (Satisfied or Very satisfied)?

Response	Frequency
Very satisfied.	15
Satisfied.	30
Less than fully satisfied.	12
Not satisfied.	4

A) 73.8% B) 49.2% C) 68.9% D) 26.2% E) 24.6%

Objective: (6) Quiz F

47) A clothing store uses comment cards to get feedback from its customers about newly added items. It recently introduced plus size fashion wear. Customers who purchased the items were asked to fill out an online comment survey giving 10% off the next purchase. The data are summarized in the table below. What percentage of customers would be less likely to purchase another item (Less or Not fully satisfied)?

Response	Frequency
Very satisfied.	15
Satisfied.	30
Less than fully satisfied.	12
Not satisfied.	4

A) 10% B) 40% C) 15% D) 50% E) 77%

Objective: (6) Quiz F

48) A clothing store uses comment cards to get feedback from its customers about newly added items. It recently introduced plus size fashion wear. Customers who purchased the items were asked to fill out an online comment survey giving 10% off the next purchase. The data are summarized in the table below. Which of the following would be an appropriate method for displaying the data shown in the table?

Response	Frequency
Very satisfied.	15
Satisfied.	30
Less than fully satisfied.	12
Not satisfied.	4

A) Dotplot
B) Pie chart
C) Histogram
D) Stem-and-leaf display
E) Both C and D

Objective: (6) Quiz F

49) The following table shows total assets ($ billion) for a small sample of U.S. banks.

BANK	ASSETS ($ billion)
Bank of New York	88
Regions Financial	80
Fifth Third Bank	58
State Street Bank and Trust	92
Branch Banking and Trust Company	81
Chase Bank	70
Key Bank	89
PNC Bank	84

The mean for these data is

A) $ 100.35 billion.
B) $ 80.25 billion.
C) $ 75.68 billion.
D) $ 89 billion.
E) $ 84 billion.

Objective: (6) Quiz F

50) The following table shows total assets ($ billion) for a small sample of U.S. banks.

BANK	ASSETS ($ billion)
Bank of New York	88
Regions Financial	80
Fifth Third Bank	58
State Street Bank and Trust	92
Branch Banking and Trust Company	81
Chase Bank	70
Key Bank	89
PNC Bank	84

The standard deviation for these data is

A) $ 11.27 billion.
B) $ 127.01 billion.
C) $12.78 billion.
D) $ 21.67 billion.
E) $ 34 billion.

Objective: (6) Quiz F

51) Consider the five number summary of hourly wages ($) for a sample of sales managers.

Min	Q1	Median	Q3	Max
20.94	37.64	44.77	49.34	67.11

The range for these data is

A) $44.77. B) $20.94. C) $46.17. D) $11.70. E) $67.11.

Objective: (6) Quiz F

52) Consider the five number summary of hourly wages ($) for a sample of sales managers.

Min	Q1	Median	Q3	Max
20.94	37.64	44.77	49.34	67.11

The IQR for these data is

A) $67.11. B) $11.70. C) $44.77. D) $46.17. E) $20.94.

Objective: (6) Quiz F

53) Consider the five number summary of hourly wages ($) for a sample of sales managers. Suppose the mean hourly wage is $38.50. What can we say about the shape of the distribution?

Min	Q1	Median	Q3	Max
20.94	37.64	44.77	49.34	67.11

A) The distribution of hourly wages for sales managers is skewed left.
B) The distribution of hourly wages for sales managers is symmetric.
C) The distribution of hourly wages for sales managers is skewed right.
D) The distribution of hourly wages for sales managers is bimodal.
E) None of the above

Objective: (6) Quiz F

54) Consider the five number summary of hourly wages ($) for a sample of advertising / promotion managers.

Min	Q1	Median	Q3	Max
19.64	29.36	34.18	40.86	57.26

Suppose there had been an error and that the lowest hourly wage was $15.50 instead of $19.64. This would result in

A) a decrease in the IQR.
B) a decrease in the range.
C) an increase in the median.
D) an increase in the mean.
E) an increase in the standard deviation.

Objective: (6) Quiz F

55) Of the following stem-and-leave plots of four data sets each containing 11 observations, which represents the set of data that has the greatest standard deviation?

Variable: Set A	Variable: Set B	Variable: Set C	Variable: Set D
Decimal point is at the colon. Leaf unit = 0.1	Decimal point is at the colon. Leaf unit = 0.1	Decimal point is at the colon. Leaf unit = 0.1	Decimal point is at the colon. Leaf unit = 0.1
0 : 0 1 : 0 2 : 0 3 : 0 4 : 0 5 : 0 6 : 0 7 : 0 8 : 0 9 : 0 10 : 0	0 : 012345 1 : 2 : 3 : 4 : 5 : 6 : 7 : 8 : 9 : 6789 10 : 0	0 : 0123 1 : 2 : 3 : 4 : 9 5 : 01 6 : 7 : 8 : 9 : 789 10 : 0	0 : 012 1 : 2 : 3 : 4 : 89 5 : 012 6 : 7 : 8 : 9 : 89 10 : 0

A) Set A
B) Set B
C) Set C
D) Set D
E) both Set C and Set D

Objective: (6) Quiz F

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

Has the percentage of young girls drinking milk changed over time? The following table is consistent with the results from "Beverage Choices of Young Females: Changes and Impact on Nutrient Intakes" (Shanthy A. Bowman, *Journal of the American Dietetic Association*, *102*(9), pp. 1234-1239):

		Nationwide Food Survey Years			
		1987-1988	1989-1991	1994-1996	Total
Drinks Fluid Milk	Yes	354	502	366	1222
	No	226	335	366	927
	Total	580	837	732	2149

56) Find the following:
a. What percent of the young girls reported that they drink milk?
b. What percent of the young girls were in the 1989-1991 survey?
c. What percent of the young girls who reported that they drink milk were in the 1989-1991 survey?
d. What percent of the young girls in 1989-1991 reported they drink milk?

Objective: (1) Quiz A

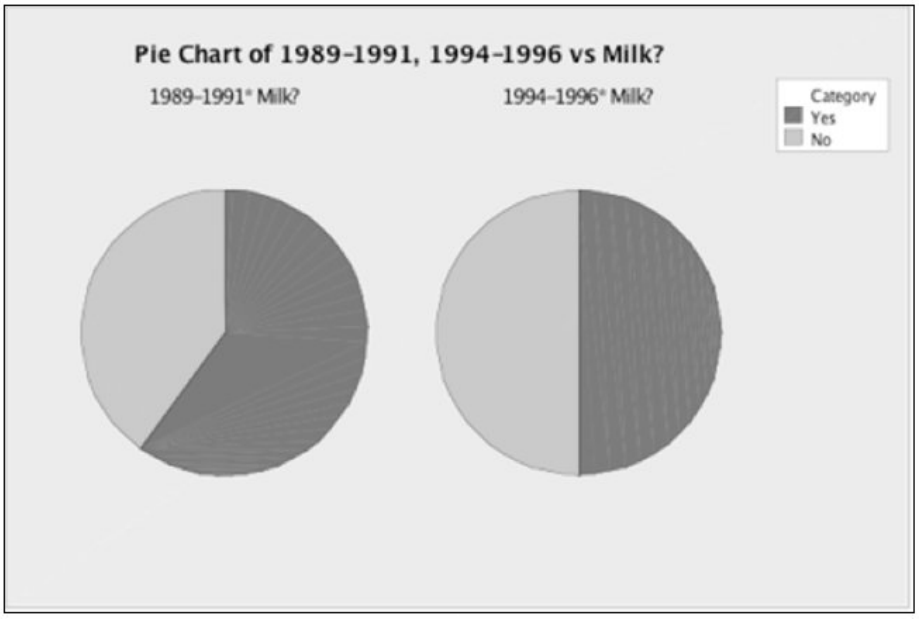
57) What is the marginal distribution of milk consumption?

Objective: (1) Quiz A

58) Do you think that milk consumption by young girls is independent of the nationwide survey year? Use statistics to justify your reasoning.

Objective: (1) Quiz A

59) Consider the following pie charts of a subset of the data above:



Do the pie charts above indicate that milk consumption by young girls is independent of the nationwide survey year? Explain.

Objective: (1) Quiz A

To determine if people's preference in dogs had changed in the recent years, organizers of a local dog show asked people who attended the show to indicate which breed was their favorite. This information was compiled by dog breed and gender of the people who responded. The table summarizes the responses.

	Female	Male	Total
Yorkshire Terrier	73	59	132
Dachshund	49	47	96
Golden Retriever	58	33	91
Labrador	37	41	78
Dalmatian	45	28	73
Other breeds	86	67	153
Total	348	275	623

60) Identify the variables and tell whether each is categorical or quantitative.

Objective: (2) Quiz B

61) Which of the W's are unknown for these data?

Objective: (2) Quiz B

62) Find each percent.

a. What percent of the responses were from males who favor Labradors?
b. What percent of the male responses favor Labradors?
c. What percent of the people who choose Labradors were males?

Objective: (2) Quiz B

63) What is the marginal distribution of breeds?

Objective: (2) Quiz B

64) Write a sentence or two about the conditional relative frequency distribution of the breeds among female respondents.

Objective: (2) Quiz B

65) Do you think the breed selection is independent of gender? Give statistical evidence to support your conclusion.

Objective: (2) Quiz B

In order to plan transportation and parking needs at a private high school, administrators asked students how they get to school. Some rode a school bus, some rode in with parents or friends, and others used "personal" transportation — bikes, skateboards, or just walked. The table summarizes the responses from boys and girls.

	Male	Female	Total
Bus	30	34	64
Ride	37	45	82
Personal	19	23	42
Total	86	102	188

66) Identify the variables and tell whether each is categorical or quantitative.

Objective: (3) Quiz C

67) Which of the W's are unknown for these data?

Objective: (3) Quiz C

68) Find each percent.

a. What percent of the students are girls who ride the bus?
b. What percent of the girls ride the bus?
c. What percent of the bus riders are girls?

Objective: (3) Quiz C

69) What is the marginal distribution of gender?

Objective: (3) Quiz C

70) Do you think mode of transportation is independent of gender? Give statistical evidence to support your conclusion.

Objective: (3) Quiz C

71) After the survey is conducted, a student suggests that the distance a student lives from school is a more important variable to consider. Describe how this third variable might affect the analyses.

Objective: (3) Quiz C

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

72) A large national retailer of electronics conducted a survey to determine consumer preferences for various brands of digital cameras and the data are summarized in the table shown below.

	Female	Male	Total
Cannon Power Shot	73	59	132
Nikon Cool Pix	49	47	96
Sony Cyber Shot	58	33	91
Panasonic Lumix	35	30	65
Fujifilm Finepix	45	28	73
Olympus S/V	37	41	78
Other Brands	86	67	153
Total	383	305	688

The percentage of consumers who are male and prefer Fujifilm is

A) 44.3 % (305/688).
B) 56.2% (41/73).
C) 10.6% (73/688).
D) 4.1% (28/688).
E) 38.4% (28/73).

Objective: (4) Quiz D

73) A large national retailer of electronics conducted a survey to determine consumer preferences for various brands of digital cameras and the data are summarized in the table shown below.

	Female	Male	Total
Cannon Power Shot	73	59	132
Nikon Cool Pix	49	47	96
Sony Cyber Shot	58	33	91
Panasonic Lumix	35	30	65
Fujifilm Finepix	45	28	73
Olympus S/V	37	41	78
Other Brands	86	67	153
Total	383	305	688

Of the consumers who are male, the percentage who prefer Sony is

A) 44.3 % (305/688).
B) 13.2% (91/688).
C) 10.8% (33/305).
D) 36.3% (33/91).
E) 4.8% (33/688).

Objective: (4) Quiz D

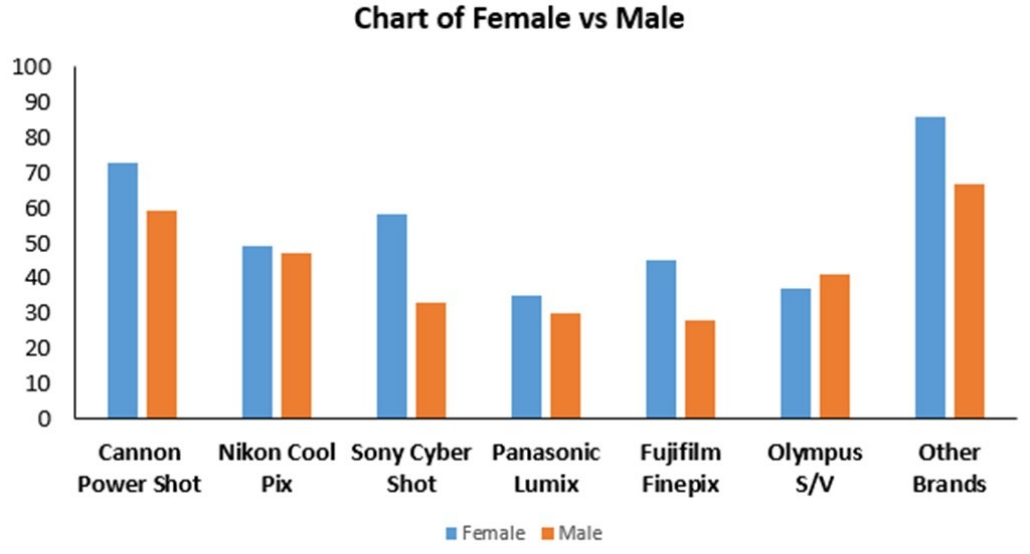
74) A large national retailer of electronics conducted a survey to determine consumer preferences for various brands of digital cameras and the data are summarized in the table shown below. Of the consumers who prefer Olympus, what percentage is female?

	Female	Male	Total
Cannon Power Shot	73	59	132
Nikon Cool Pix	49	47	96
Sony Cyber Shot	58	33	91
Panasonic Lumix	35	30	65
Fujifilm Finepix	45	28	73
Olympus S/V	37	41	78
Other Brands	86	67	153
Total	383	305	688

A) 6.0% (41/688)
B) 11.7% (45/383)
C) 47.4 % (37/78)
D) 11.3% (78/688)
E) 52.6% (41/78)

Objective: (4) Quiz D

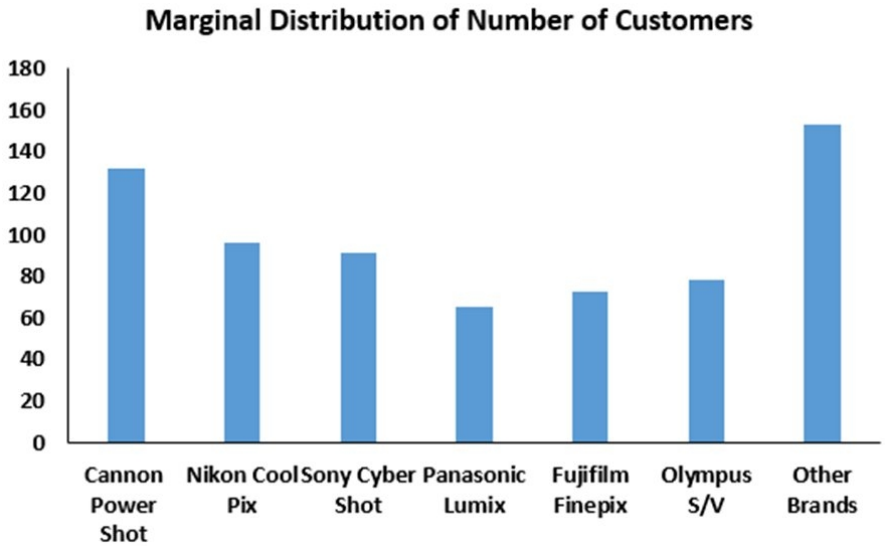
75) Based on the side-by-side bar chart summarizing consumer preferences for various brands of digital cameras by gender, which of the following statement(s) are TRUE?



A) More females than males prefer Sony.
B) It appears that camera preference and gender are at least somewhat related.
C) More males than females prefer Cannon.
D) If Other Brands are ignored, it is not obvious that camera preference and gender are independent.
E) If Other Brands are ignored, it appears that camera preference and gender are independent.

Objective: (4) Quiz D

76) The following is a bar chart summarizing consumer preferences for various brands of digital cameras.



This bar chart shows

A) the distribution for a quantitative variable.
B) the marginal distribution of brands.
C) the conditional distribution of brands.
D) the contingency distribution of brands.
E) none of the above.

Objective: (4) Quiz D

77) A company interested in the health of its employees started a health program including monitoring blood pressure. Based on age, employees were categorized according to ranges of blood pressure by age intervals. Data are shown in the table below.

	Age			
BP	Under 30	30-49	Over 50	Total
Low	27	38	31	96
Normal	48	90	92	230
High	23	59	72	154
Total	98	187	195	480

The percentage of employees who are over age 50 and have high blood pressure is

A) 46.8% (72/154).
B) 15.0% (72/480).
C) 31.6% (59/187).
D) 36.9% (72/195).
E) 32.1% (154/480).

Objective: (4) Quiz D

78) A company interested in the health of its employees started a health program including monitoring blood pressure. Based on age, employees were categorized according to ranges of blood pressure by age intervals. Data are shown in the table below.

	Age			
BP	Under 30	30-49	Over 50	Total
Low	27	38	31	96
Normal	48	90	92	230
High	23	59	72	154
Total	98	187	195	480

Of all employees, the percentage who are over 50 and have high blood pressure is

A) 31.6% (59/187).
B) 47.2% (92/195).
C) 15.0% (72/480).
D) 36.9% (72/195).
E) 46.8% (72/154).

Objective: (4) Quiz D

79) A company interested in the health of its employees started a health program including monitoring blood pressure. Based on age, employees were categorized according to ranges of blood pressure by age intervals. Data are shown in the table below.

	Age			
BP	Under 30	30-49	Over 50	Total
Low	27	38	31	96
Normal	48	90	92	230
High	23	59	72	154
Total	98	187	195	480

Of all employees, the percentage of those under 50 years old is

A) 36.9% (72/195).
B) 49.4% (285/480).
C) 17.1% (82/480).
D) 13.5% (65/480).
E) 40.6% (195/480).

Objective: (4) Quiz D

80) A company interested in the health of its employees started a health program including monitoring blood pressure. Based on age, employees were categorized according to ranges of blood pressure by age intervals. Data are shown in the table below.

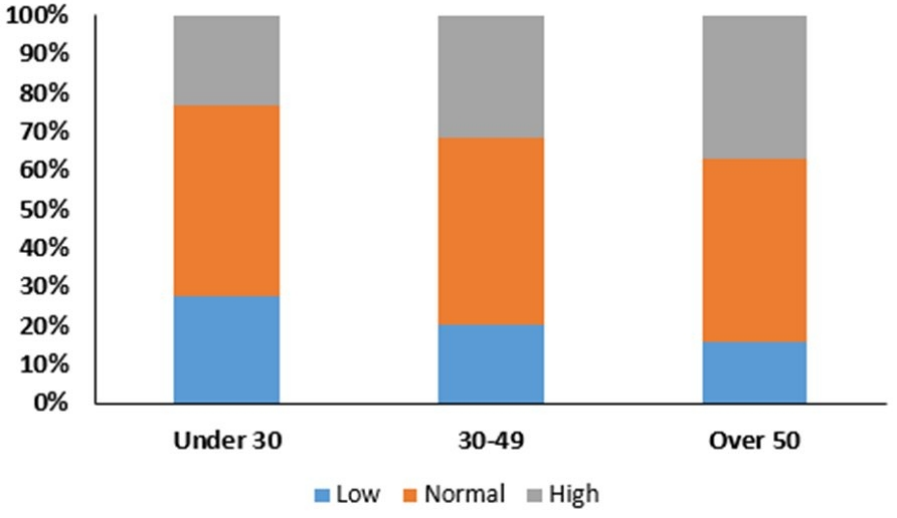
	Age			
BP	Under 30	30-49	Over 50	Total
Low	27	38	31	96
Normal	48	90	92	230
High	23	59	72	154
Total	98	187	195	480

The percentage of employees with normal or low blood pressure is

A) 47.9% (230/480).
B) 41.7% (96/230).
C) 80.0% (384/480).
D) 20.0% (96/480).
E) 67.9% (326/480).

Objective: (4) Quiz D

81) Here is a stacked bar chart for data collected about employee blood pressure.



This chart shows

A) the contingency distribution of blood pressure type.
B) the marginal distribution of blood pressure type.
C) the distribution of a quantitative variable.
D) the joint distribution of blood pressure type.
E) the conditional distribution of blood pressure type.

Objective: (4) Quiz D

82) In May, 2010, the *Pew Research Center for the People & the Press* carried out a national survey to gauge opinion on the Arizona Immigration Law. Responses (*Favor, Oppose, Don't Know*) were examined according to groups defined by political party affiliation (*Democrat, Republican, Independent*). Which of the following would be appropriate for displaying these data?

A) Pie charts
B) Segmented bar chart
C) Contingency table
D) Side by side bar chart
E) All of the above

Objective: (5) Quiz E

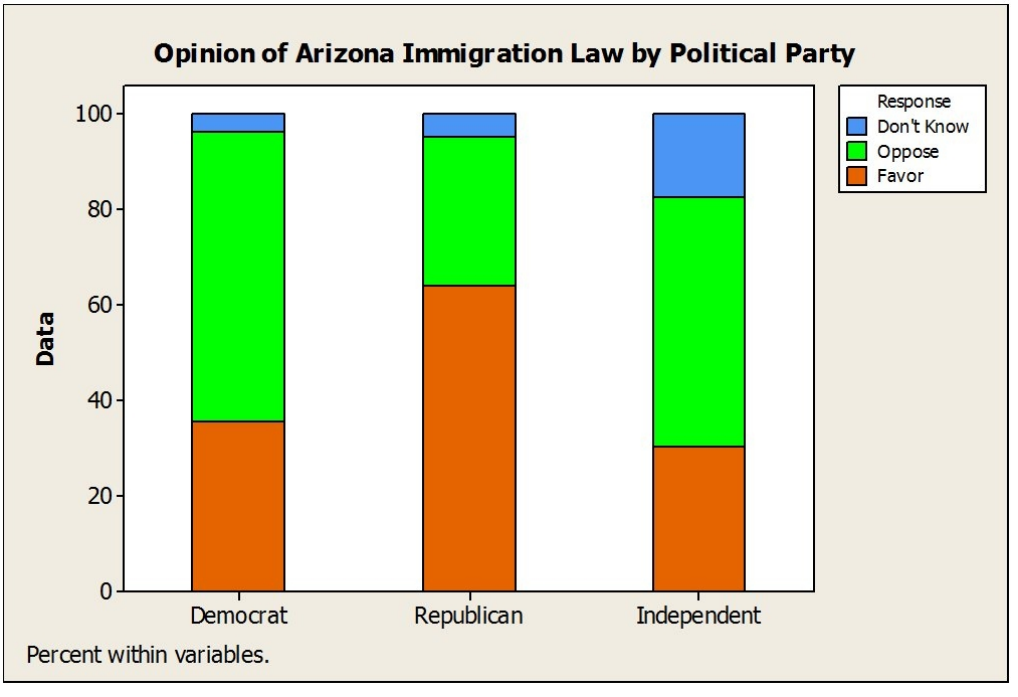
83) A regional survey was carried out to gauge public opinion on the controversial Arizona Immigration Law (results shown below). How many respondents are Republican and favor the law?

Response	*Democrat*	*Republican*	*Independent*
Favor	50	93	35
Oppose	85	45	60
Don't Know	5	7	20

A) 93 B) 85 C) 45 D) 145 E) 7

Objective: (5) Quiz E

84) A regional survey was carried out to gauge public opinion on the controversial Arizona Immigration Law. The results are displayed in the segmented bar chart below. Which of the following statements is TRUE?



A) A greater percentage of Republicans oppose the law compared to Democrats.
B) Opinion about the law appears to be independent of political party affiliation.
C) A greater percentage of Republicans oppose the law compared to Independents.
D) A greater percentage of Democrats oppose the law compared to Republicans.
E) The segmented bar chart is not appropriate for these data.

Objective: (5) Quiz E

85) A regional survey was carried out to gauge public opinion on the controversial Arizona Immigration Law. Based on the results displayed in the table below, what percent of respondents is Independent?

Response	*Democrat*	*Republican*	*Independent*
Favor	50	93	35
Oppose	85	45	60
Don't Know	5	7	20

A) 45% B) 9% C) 25% D) 29% E) 35%

Objective: (5) Quiz E

86) A regional survey was carried out to gauge public opinion on the controversial Arizona Immigration Law (results shown below). What percent oppose the law?

Response	*Democrat*	*Republican*	*Independent*
Favor	50	93	35
Oppose	85	45	60
Don't Know	5	7	20

A) 45% B) 32% C) 48% D) 25% E) 61%

Objective: (5) Quiz E

87) A regional survey was carried out to gauge public opinion on the controversial Arizona Immigration Law (results shown below). Of respondents who are Democrat, what percent oppose the law?

Response	*Democrat*	*Republican*	*Independent*
Favor	50	93	35
Oppose	85	45	60
Don't Know	5	7	20

A) 45% B) 13% C) 61% D) 35% E) 22%

Objective: (5) Quiz E

88) A regional survey was carried out to gauge public opinion on the controversial Arizona Immigration Law (results shown below). Of respondents who oppose the law, what percent is Democrat?

Response	*Democrat*	*Republican*	*Independent*
Favor	50	93	35
Oppose	85	45	60
Don't Know	5	7	20

A) 35% B) 22% C) 6% D) 13% E) 45%

Objective: (5) Quiz E

89) Accenture, a consulting firm, conducted an online survey of 500 US consumers from in 2013.

Response	*Male*	*Female*
Too busy to shop earlier	115	75
More time to save for gifts	50	80
Better discounts available	65	20
Part of the holiday tradition	15	5
None of the above	120	60

What percentage of men were felt that better discounts were available on "Black Friday"?

A) 26.5% B) 20% C) 17.8% D) 65% E) 5.5%

Objective: (5) Quiz E

90) Accenture, a consulting firm, conducted an online survey of 500 US consumers from in 2013.

Response	*Male*	*Female*
Too busy to shop earlier	115	75
More time to save for gifts	50	80
Better discounts available	65	20
Part of the holiday tradition	15	5
None of the above	120	60

What percentage of those who thought that better discounts were available on "Black Friday" were female?

A) 23.5% B) 81.3% C) 47.2% D) 33.3% E) 11.1%

Objective: (5) Quiz E

91) Accenture, a consulting firm, conducted an online survey of 500 US consumers in September 2013. Based on their response to the question "What is your motive for shopping late in the season?" which of the following would be appropriate method(s) for displaying the male only data shown in the table?

Response	*Male*	*Female*
Too busy to shop earlier	115	75
More time to save for gifts	50	80
Better discounts available	65	20
Part of the holiday tradition	15	5
None of the above	120	60

A) Pie chart
B) Contingency table
C) Segmented bar chart
D) Side by side bar chart
E) All of the above

Objective: (5) Quiz E

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

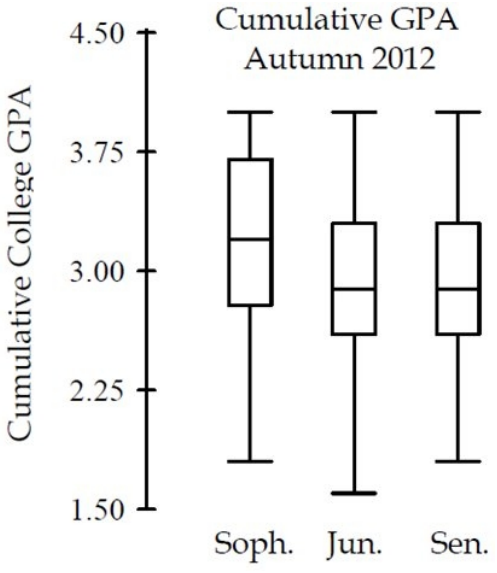
92) The five-number summary for midterm scores (number of points; the maximum possible score was 50 points) from an intro stats class is:

Min	Q1	Median	Q3	Max
16.5	32	39	43.5	48.5

a. Would you expect the mean midterm score of all students who took the midterm to be higher or lower than the median? Explain.
b. Based on the five-number summary, are any of the midterm scores outliers? Explain.

Objective: (1) Quiz A

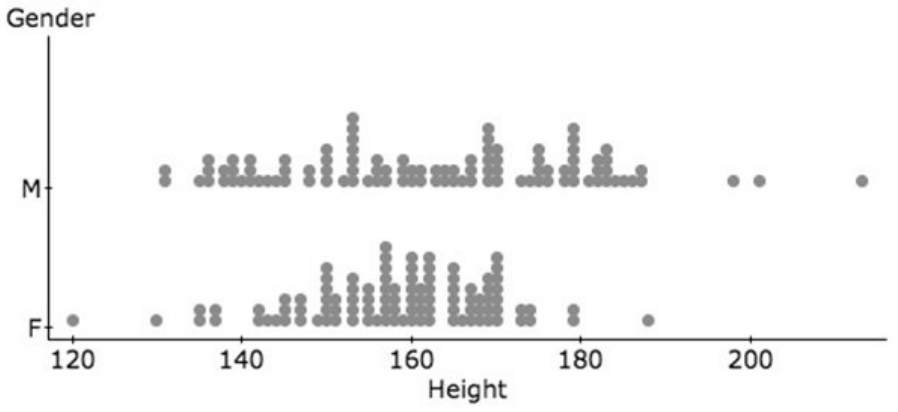
93) The side-by-side boxplots show the cumulative college GPAs for sophomores, juniors, and seniors taking an intro stats course in Autumn 2012.



a. Which class (sophomore, junior, or senior) had the lowest cumulative college GPA? What is the approximate value of that GPA?
b. Which class has the highest median GPA, and what is that GPA?
c. Which class has the largest range for GPA, and what is it?
d. Which class has the most symmetric set of GPAs? The most skewed set of GPAs?

Objective: (1) Quiz A

94) On the right are two dotplots made for the heights of 200 randomly chosen students. The heights are separated by gender. Describe and compare the distributions.



Objective: (1) Quiz A

95) A few of the male students are considerably taller than the rest. Describe the effect that these taller males will have on the mean and median of the male distribution.

Objective: (1) Quiz A

96) The body temperature of students is taken each time a student goes to the nurse's office. The five-number summary for the temperatures (in degrees Fahrenheit) of students on a particular day is:

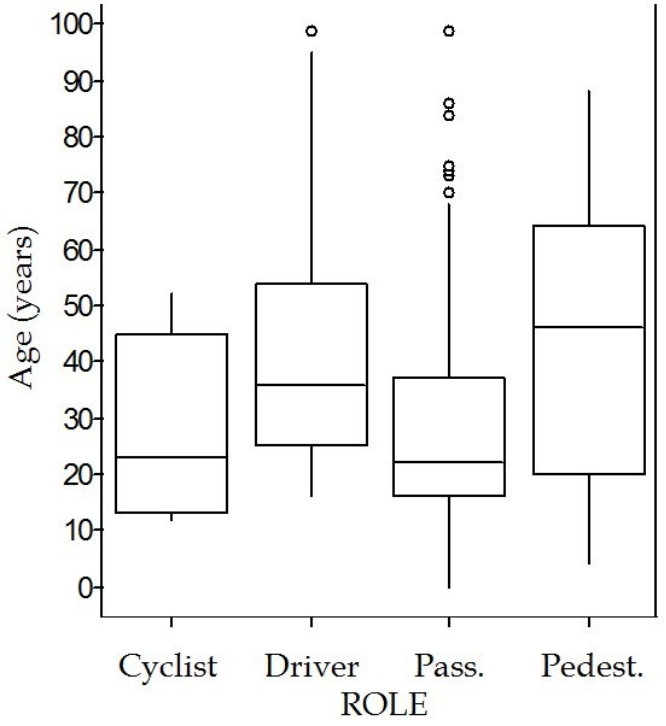
Min	Q1	Median	Q3	Max
96.6°	97.85°	98.25°	98.6°	101.8°

a. Would you expect the mean temperature of all students who visited the nurse's office to be higher or lower than the median? Explain.

b. After the data were picked up in the afternoon, three more students visited the nurse's office with temperatures of 96.7°, 98.4°, and 99.2°. Were any of these students outliers? Explain.

Objective: (2) Quiz B

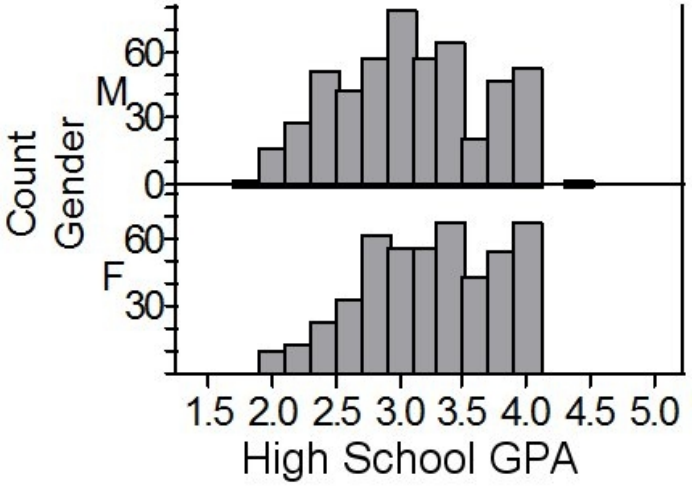
97) The boxplots show the age of people involved in accidents according to their role in the accident.



a. Which role involved the youngest person, and what is the age?
b. Which role had the lowest median age, and what is the age?
c. Which role had smallest range of ages, and what is it?
d. Which role had the largest IQR of ages, and what is it?
e. Which role generally involves the oldest people? Explain.

Objective: (2) Quiz B

98) One thousand students from a local university were sampled to gather information such as gender, high school GPA, college GPA, and total SAT scores. The results were used to create histograms displaying high school grade point averages (GPAs) for both males and females. Compare the grade distribution of males and females.



Objective: (2) Quiz B

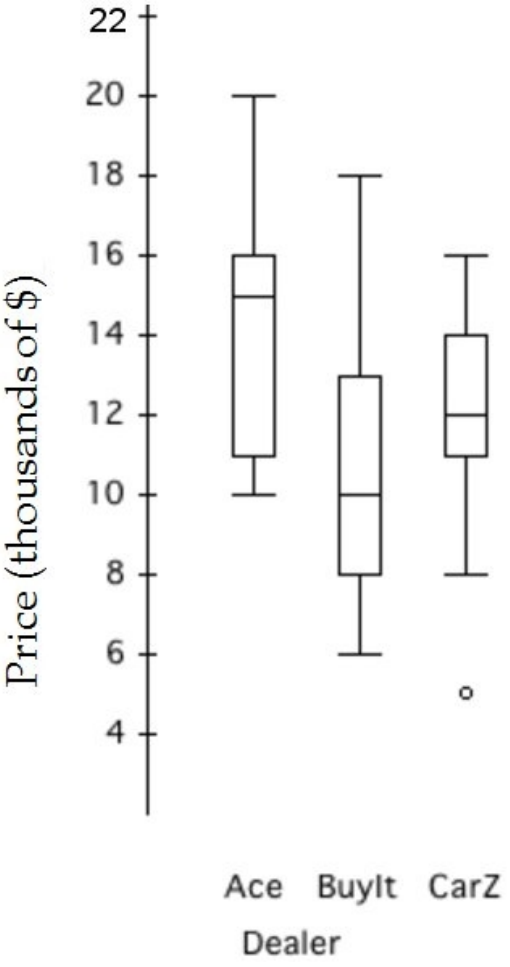
99) The five-number summary for the weights (in pounds) of fish caught in a bass tournament is:

Min	Q1	Median	Q3	Max
2.3	2.8	3.0	3.3	4.5

a. Would you expect the mean weight of all fish caught to be higher or lower than the median? Explain.
b. You caught 3 bass weighing 2.3 pounds, 3.9 pounds, and 4.2 pounds. Were any of your fish outliers? Explain.

Objective: (3) Quiz C

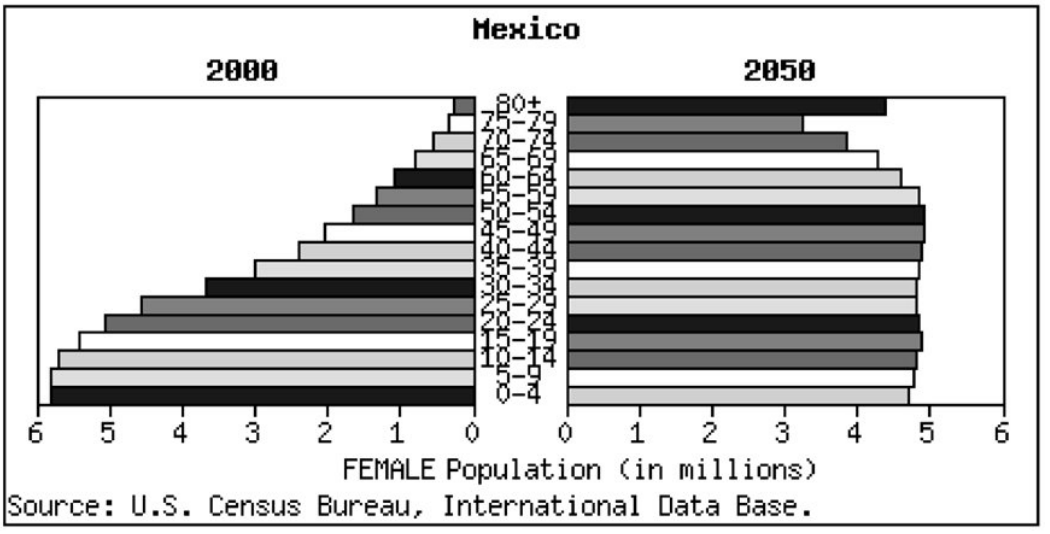
100) The boxplots show prices of used cars (in thousands of dollars) advertised for sale at three different car dealers.



a. Which dealer offers the cheapest car offered, and at what price?
b. Which dealer has the lowest median price, and how much is it?
c. Which dealer has the smallest price range, and what is it?
d. Which dealer's prices have the smallest IQR, and what is it?
e. Which dealer generally sells cars cheapest? Explain.

Objective: (3) Quiz C

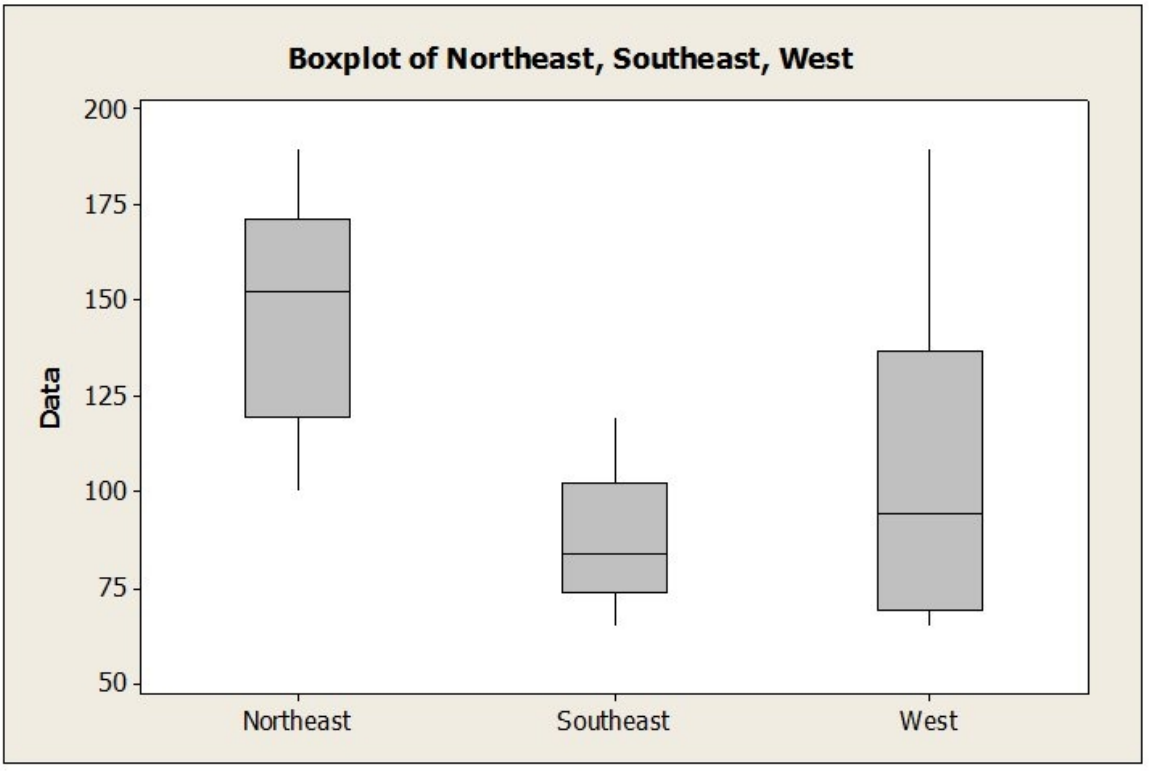
101) At www.census.gov you can create a "population pyramid" for any country. These pyramids are back-to-back histograms. This pyramid shows Mexico's 2000 female population and the census bureau's projection for 2050. Write a few sentences summarizing the changes that are forecast.



Objective: (3) Quiz C

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

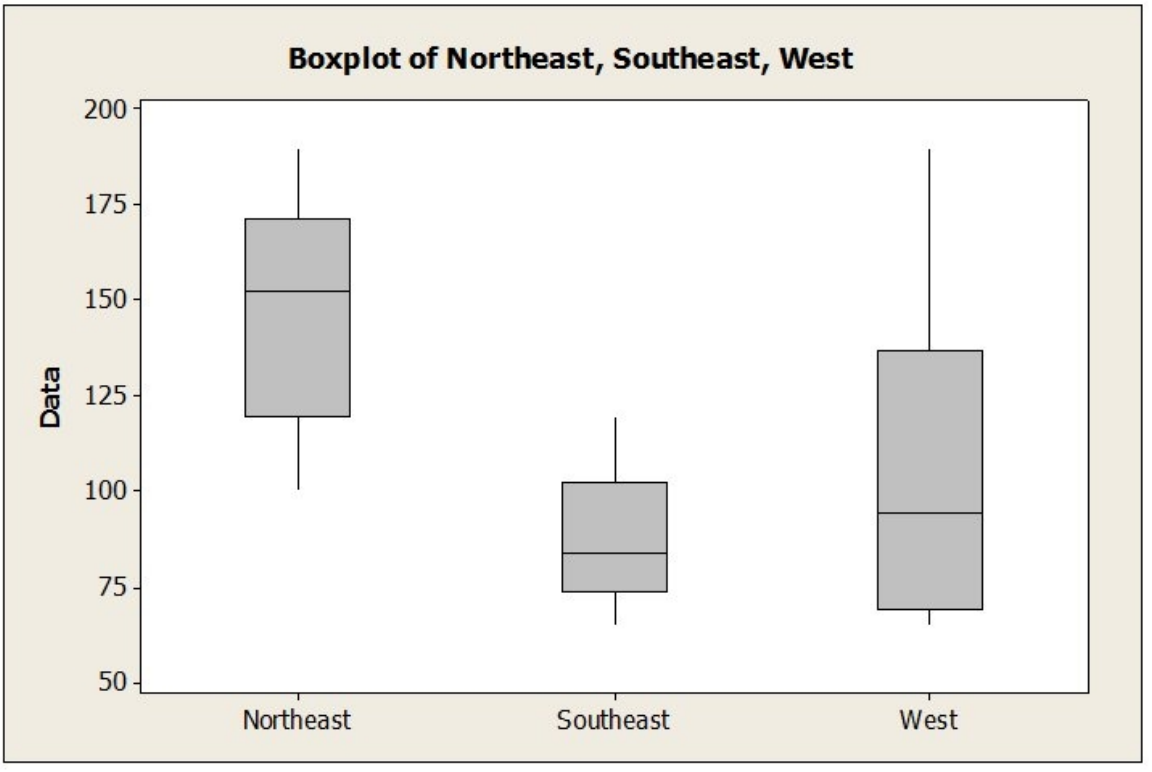
102) The following boxplots show monthly sales revenue figures ($ thousands) for a discount office supply company with locations in three different regions of the U.S. (Northeast, Southeast, and West). Which of the following statements is TRUE?



A) The West has the lowest mean sales revenue.
B) The Northeast has the lowest mean sales revenue.
C) The West has the lowest median sales revenue.
D) The Southeast has the lowest median sales revenue.
E) None of the above

Objective: (4) Quiz D

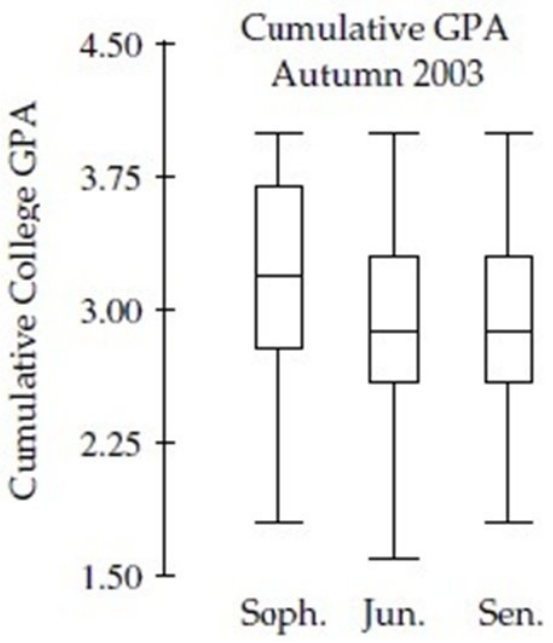
103) The following boxplots show monthly sales revenue figures ($ thousands) for a discount office supply company with locations in three different regions of the U.S. (Northeast, Southeast, and West). Which of the following statements is FALSE?



A) The West has the largest IQR.
B) The West has the most variable sales revenues.
C) The Southeast has the least variable sales revenues.
D) The Northeast has the most variable sales revenues.
E) The Southeast has the smallest IQR.

Objective: (4) Quiz D

104) The side-by-side boxplots show the cumulative college GPAs for sophomores, juniors, and seniors taking an intro stats course in Autumn 2003.

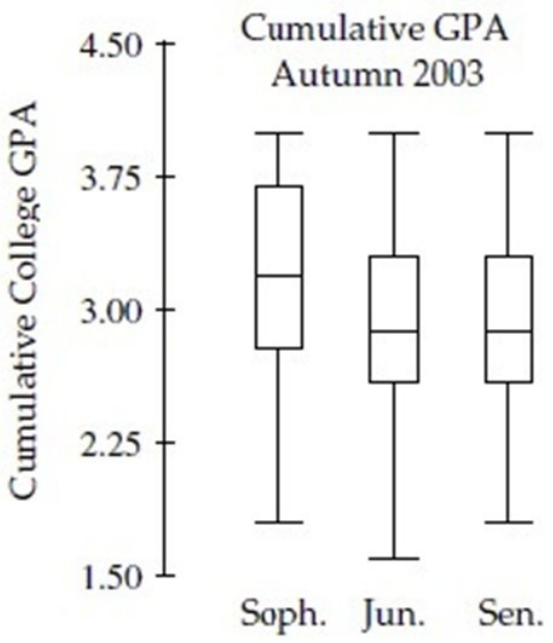


In which class (sophomore, junior, or senior) do you find the student with the lowest cumulative college GPA?

A) Senior
B) Sophomore
C) Both Sophomore and Junior
D) Both Junior and Senior
E) Junior

Objective: (4) Quiz D

105) The side-by-side boxplots show the cumulative college GPAs for sophomores, juniors, and seniors taking an intro stats course in Autumn 2003.

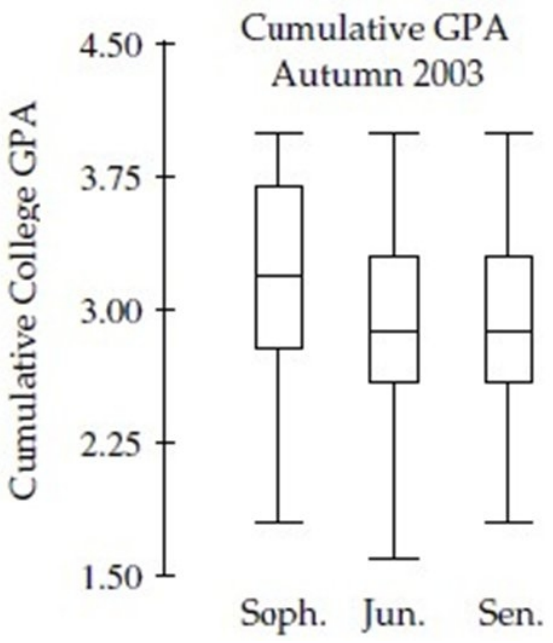


What is the approximate value of that GPA of the lowest scoring student?

A) 3.0 B) 1.6 C) 2.8 D) 2.6 E) 1.8

Objective: (4) Quiz D

106) The side-by-side boxplots show the cumulative college GPAs for sophomores, juniors, and seniors taking an intro stats course in Autumn 2003.

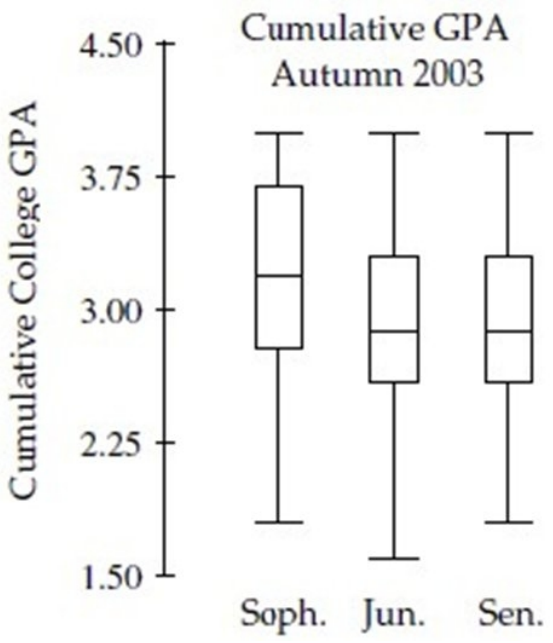


Which class has the highest median GPA?

A) Senior
B) Sophomore
C) Both Sophomore and Junior
D) Junior
E) Both Junior and Senior

Objective: (4) Quiz D

107) The side-by-side boxplots show the cumulative college GPAs for sophomores, juniors, and seniors taking an intro stats course in Autumn 2003.

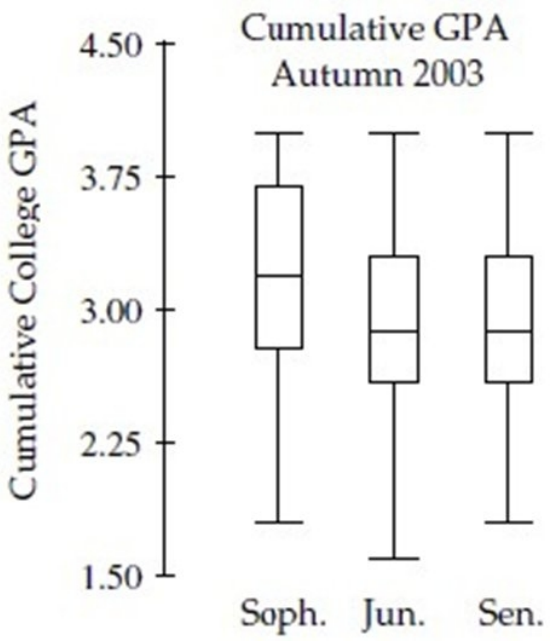


What is approximately the GPA of the class with the highest median GPA?

A) 3.2 B) 3.8 C) 2.6 D) 3.6 E) 2.8

Objective: (4) Quiz D

108) The side-by-side boxplots show the cumulative college GPAs for sophomores, juniors, and seniors taking an intro stats course in Autumn 2003.

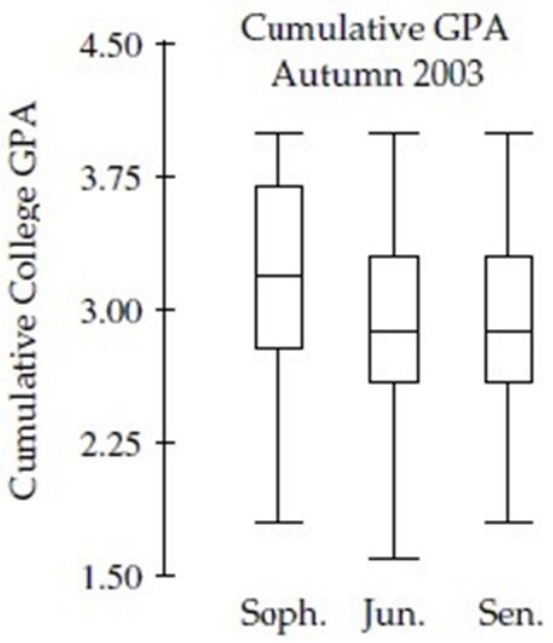


Which class has the largest range for GPA?

A) Junior
B) Both Sophomore and Junior
C) Sophomore
D) Senior
E) Both Junior and Senior

Objective: (4) Quiz D

109) The side-by-side boxplots show the cumulative college GPAs for sophomores, juniors, and seniors taking an intro stats course in Autumn 2003.

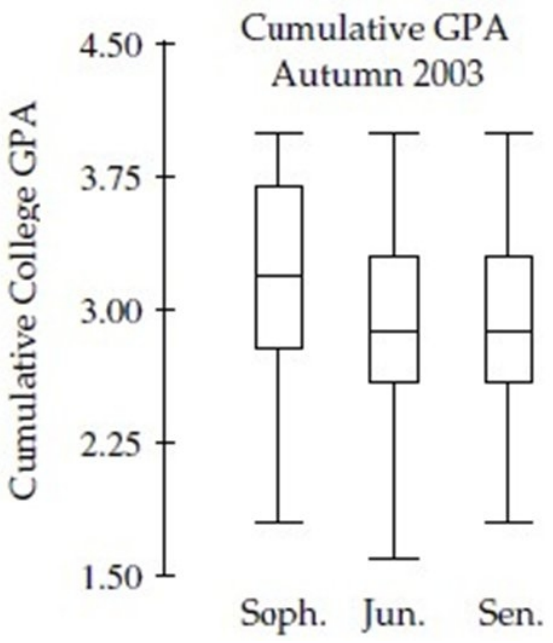


What is the approximate value of the largest range for GPA?

A) 3.0 B) 1.4 C) 1.0 D) 0.8 E) 2.4

Objective: (4) Quiz D

110) The side-by-side boxplots show the cumulative college GPAs for sophomores, juniors, and seniors taking an intro stats course in Autumn 2003.

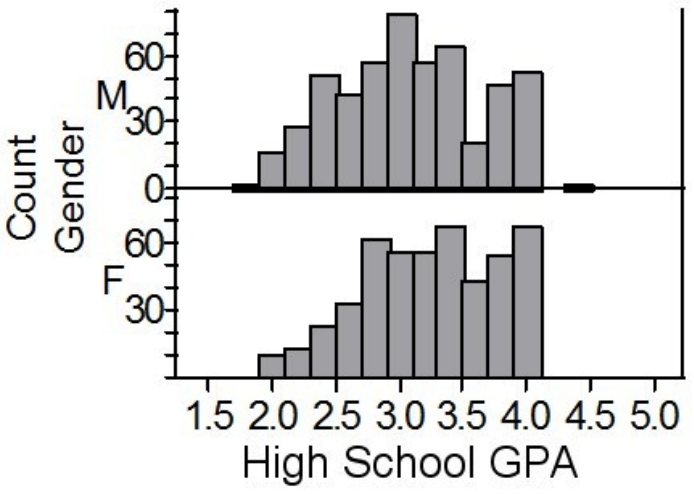


Which class has the most skewed set of GPAs?

A) Both Sophomore and Junior
B) Sophomore
C) Senior
D) Both Junior and Senior
E) Junior

Objective: (4) Quiz D

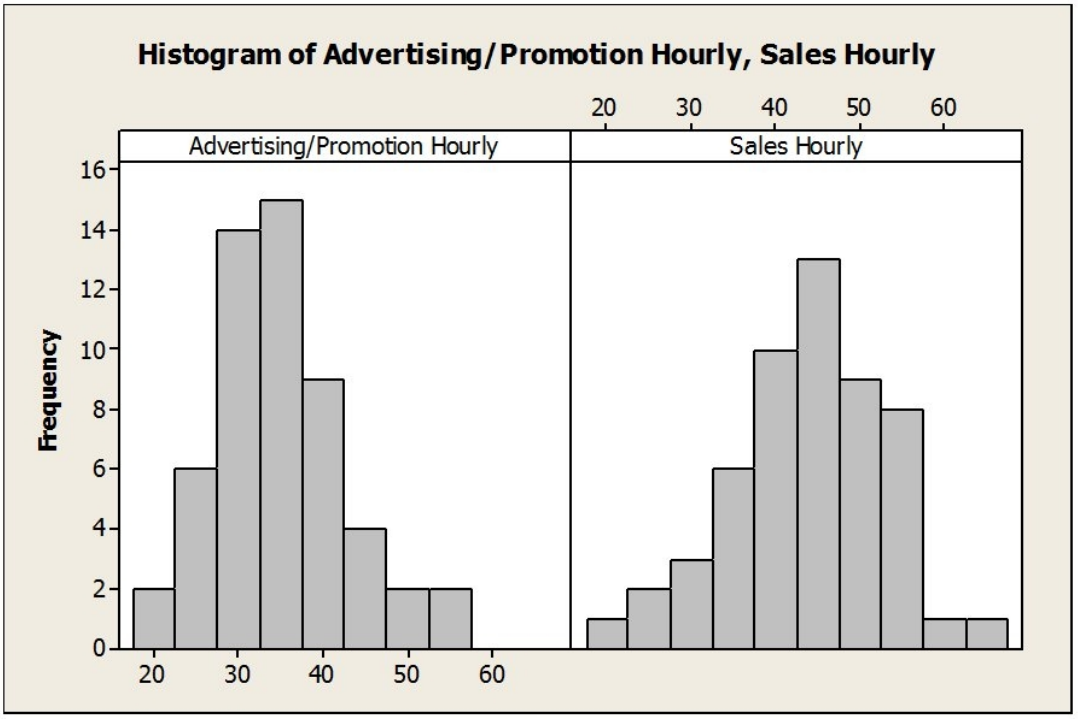
111) One thousand students from a local university were sampled to gather information such as gender, high school GPA, college GPA, and total SAT scores. The results were used to create histograms displaying high school grade point averages (GPAs) for both males and females. Compare the grade distribution of males and females. Check all that apply.



A) Both distributions are skewed to the left.
B) Both distributions appear to be centered at a GPA of about 3.0.
C) The distribution of male GPA appears slightly more spread out than the distribution of female GPA.
D) The distributions are differ strongly in center.
E) The distributions are skewed in different directions.

Objective: (4) Quiz D

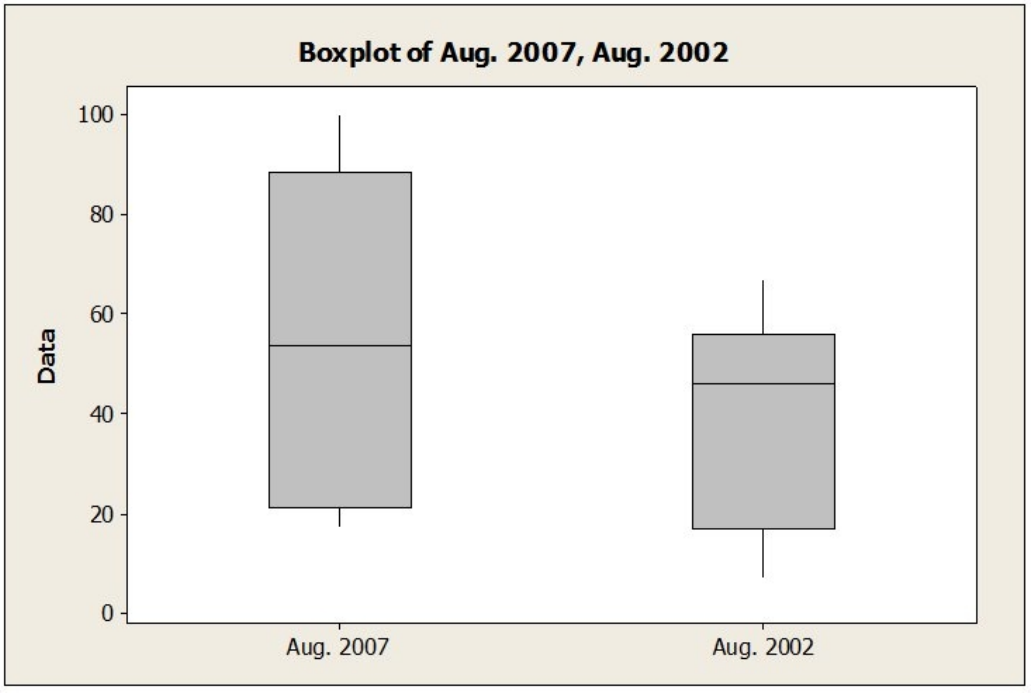
112) Data were collected on the hourly wage ($) for two types of marketing managers: (1) advertising / promotion managers and (2) sales managers. The results were used to create the following histograms. Which of the following statements is TRUE?



A) It appears that sales managers earn a lower hourly wage compared to advertising/promotion managers.
B) The distribution of hourly wages for sales managers is unimodal and skewed left.
C) The distribution of hourly wages for advertising/promotion managers is unimodal and skewed left.
D) The distribution of hourly wages for sales managers is unimodal and skewed right.
E) Both C and D

Objective: (5) Quiz E

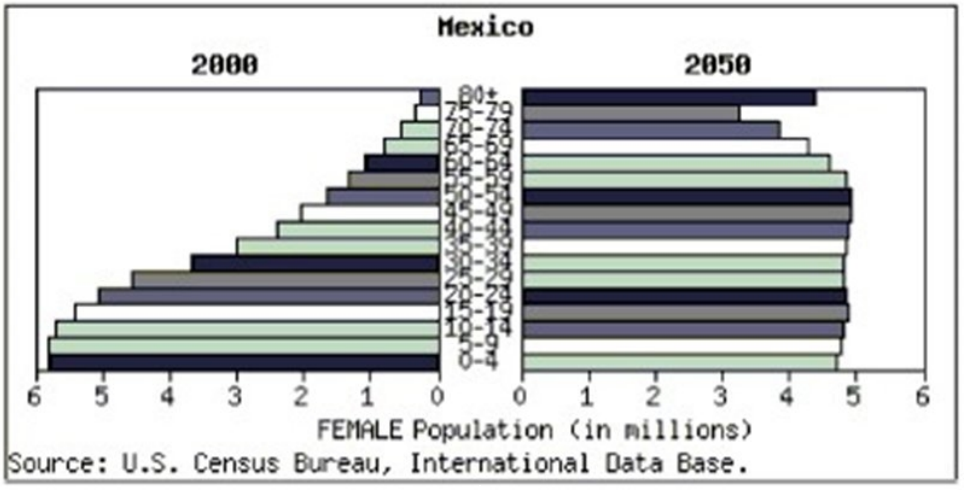
113) The following boxplots show the closing share prices for a sample of technology companies on the first trading days in August 2007 and in August 2002. Which of the following statement is TRUE?



A) Closing prices are more variable in August 2007 compared to August 2002.
B) The distribution of closing prices in August 2007 appears more symmetric than the distribution of closing prices in August 2002.
C) The median closing share price is higher in August 2007 compared to August 2002.
D) Both A and B
E) All of the above

Objective: (5) Quiz E

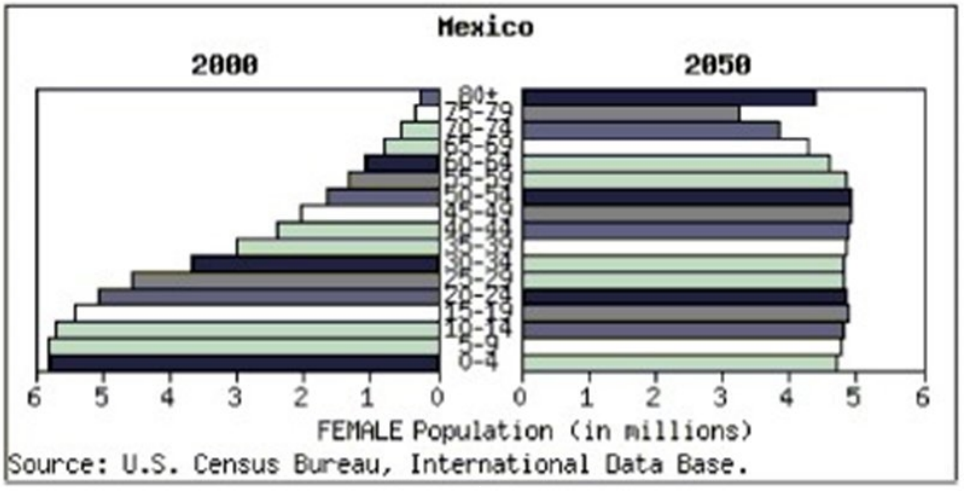
114) At www.census.gov you can create a "population pyramid" for any country. These pyramids are back-to-back histograms. This pyramid shows Mexico's 2000 female population and the census bureau's projection for 2050. Check all that apply.



A) The distribution of ages in 2000 is strongly skewed to the right.
B) The distribution of ages in 2000 is strongly skewed to the left.
C) The distribution of projected ages in 2050 is approximately uniform.
D) The distribution of projected ages in 2050 is strongly skewed to the right.
E) The distribution of projected ages in 2050 is strongly skewed to the left.

Objective: (5) Quiz E

115) At www.census.gov you can create a "population pyramid" for any country. These pyramids are back-to-back histograms. This pyramid shows Mexico's 2000 female population and the census bureau's projection for 2050. Check all that apply.

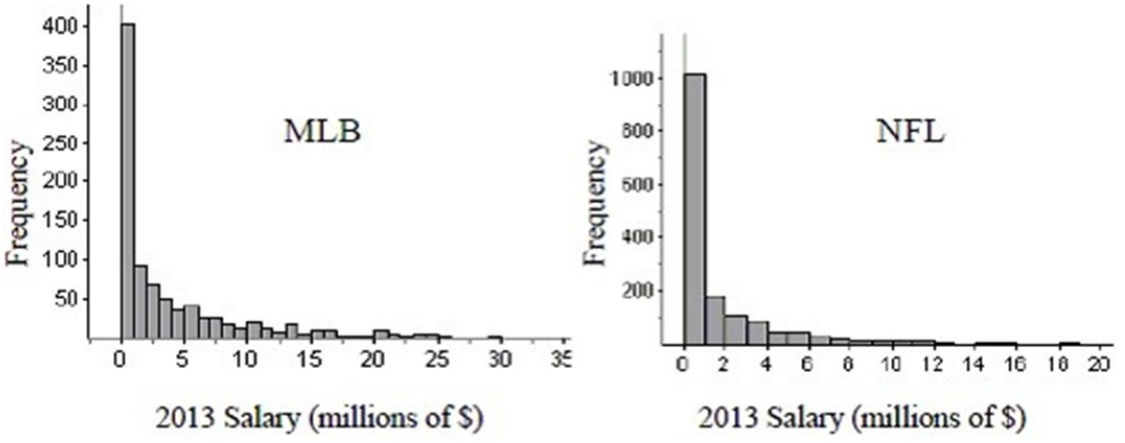


A) The expected median age in 2050 is higher than the median age in 2000.
B) The expected mean age in 2050 is lower than the mean age in 2000.
C) The IQR of the distribution of projected ages in 2050 is larger than the IQR of the distribution of ages in 2000.
D) The expected median age in 2050 is lower than the median age in 2000.
E) The expected mean age in 2050 is higher than the mean age in 2000.

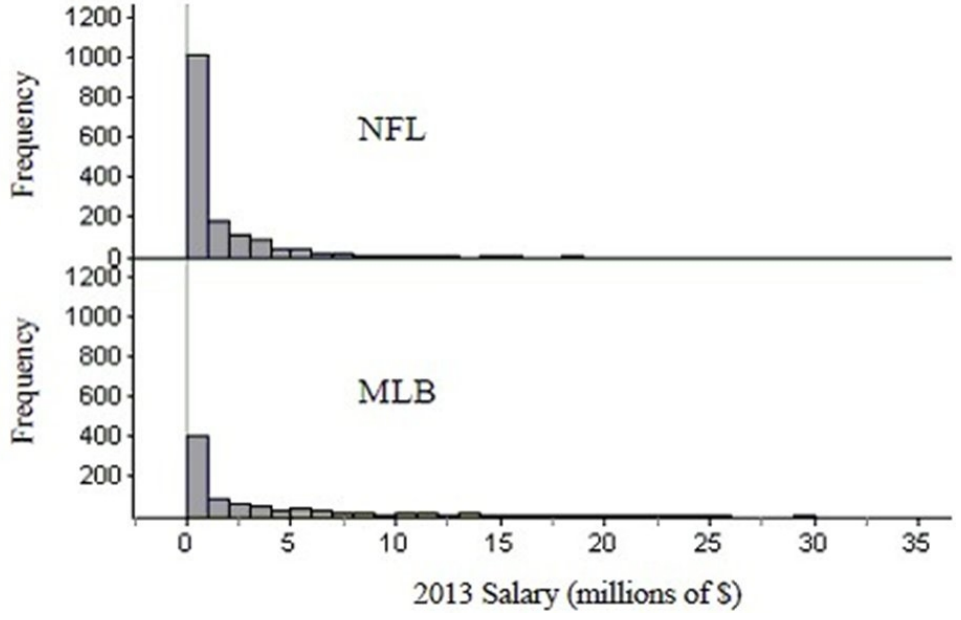
Objective: (5) Quiz E

116) How do sports salaries compare? Two sets of histograms below show the distributions of salaries for Major League Baseball and the National Football League. What set of histograms makes it easier to compare the distributions? And for what reasons? Check all that apply.

Histogram set 1



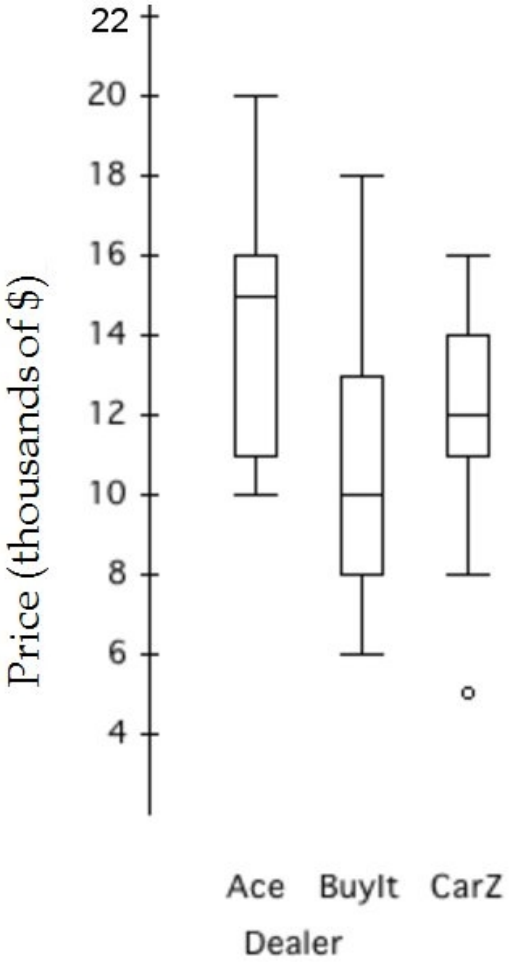
Histogram set 2



A) The second set of histograms, because it uses the same scales on the axes.
B) The first set of histograms, because it uses different scales on the axes.
C) The second set of histograms, because it is stacked vertically.
D) Both allow equal comparison.
E) The first set of histograms, because it is stacked horizontally.

Objective: (5) Quiz E

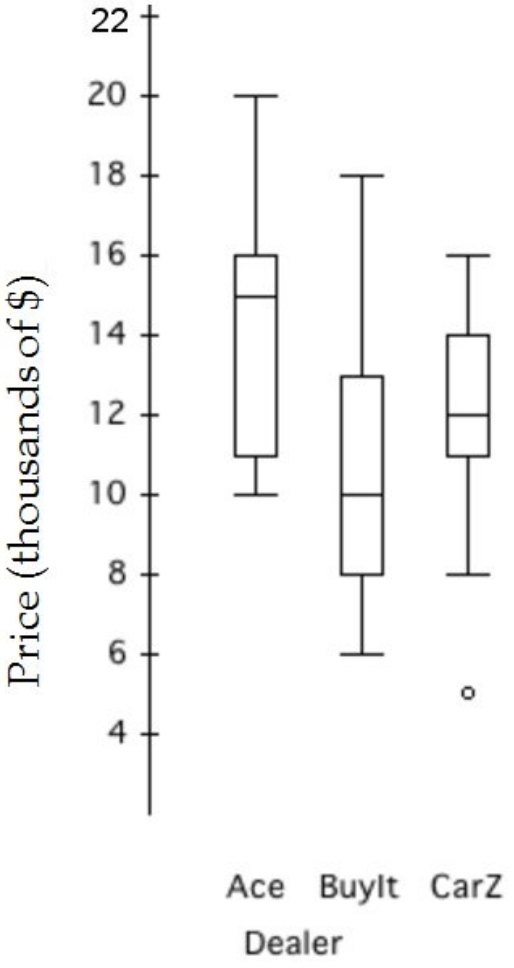
117) The boxplots show prices of used cars (in thousands of dollars) advertised for sale at three different car dealers. Which dealer offers the cheapest car offered, and at what price?



A) BuyIt: $10000
B) BuyIt: $6000
C) Car Z: $5000
D) Ace: $10000
E) Cannot say from boxplots only.

Objective: (5) Quiz E

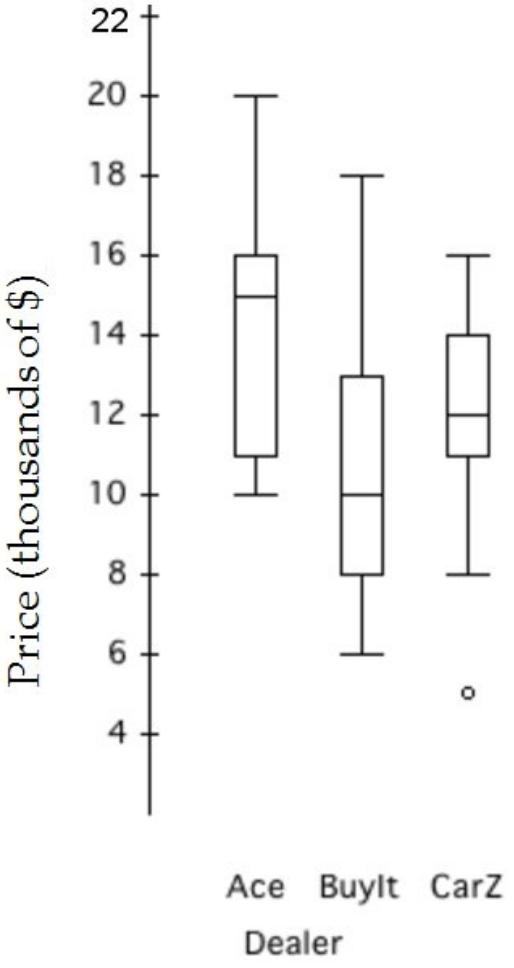
118) The boxplots show prices of used cars (in thousands of dollars) advertised for sale at three different car dealers. Which dealer has the lowest median price, and how much is it?



A) CarZ: $12000
B) BuyIt: $8000
C) Ace: $15000
D) BuyIt: $10000
E) Cannot say from boxplots only.

Objective: (5) Quiz E

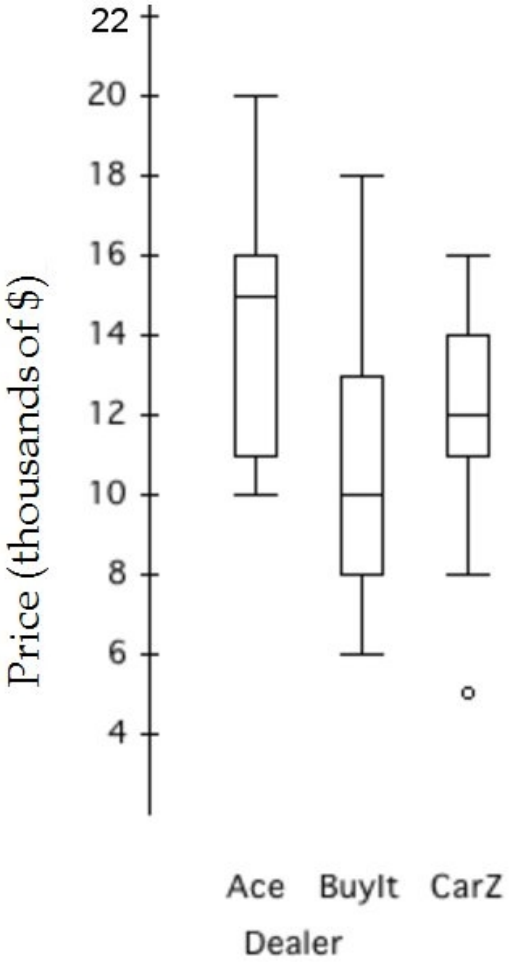
119) The boxplots show prices of used cars (in thousands of dollars) advertised for sale at three different car dealers. Which dealer has the smallest price range, and what is it?



A) BuyIt: $5000
B) CarZ: $8000
C) CarZ: $11000
D) Ace: $10000
E) Cannot say from boxplots only.

Objective: (5) Quiz E

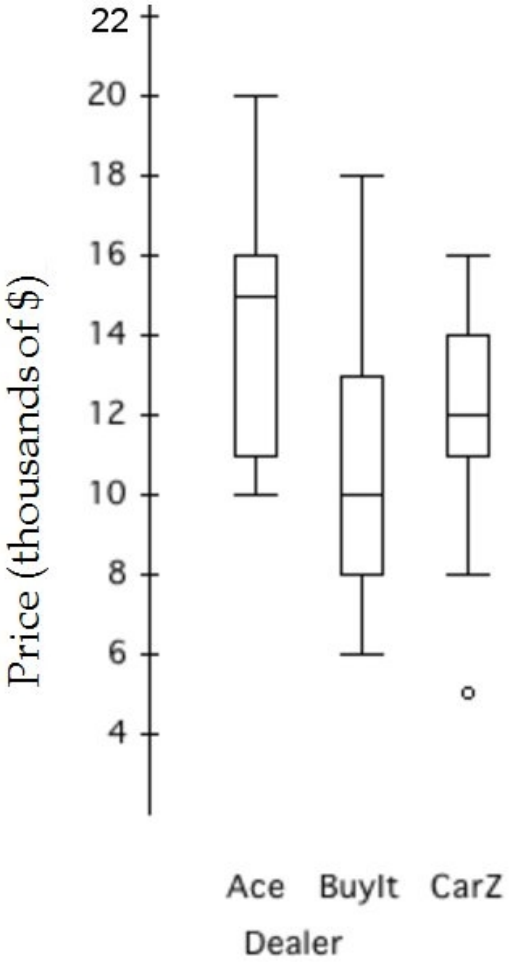
120) The boxplots show prices of used cars (in thousands of dollars) advertised for sale at three different car dealers. Which dealer's prices have the smallest IQR, and what is it?



A) CarZ: $8000
B) Ace: $5000
C) BuyIt: $5000
D) CarZ: $3000
E) Cannot say from boxplots only.

Objective: (5) Quiz E

121) The boxplots show prices of used cars (in thousands of dollars) advertised for sale at three different car dealers. Which dealer generally sells cars cheapest?



A) BuyIt
B) CarZ
C) Ace
D) Both CarZ and Ace
E) Cannot say from boxplots only.

Objective: (5) Quiz E

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

122) Students taking an intro stats class reported the number of credit hours that they were taking that quarter. Summary statistics are shown in the table.

$\bar{x}$	16.65
s	2.96
min	5
Q1	15
median	16
Q3	19
max	28

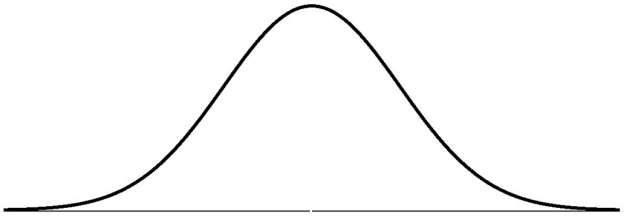
a. Suppose that the college charges $73 per credit hour plus a flat student fee of $35 per quarter. For example, a student taking 12 credit hours would pay $35 + $73(12) = $911 for that quarter.

i. What is the mean fee paid?
ii. What is the standard deviation for the fees paid?
iii. What is the median fee paid?
iv. What is the IQR for the fees paid?

b. Twenty-eight credit hours seems like a lot. Would you consider 28 credit hours to be unusually high? Explain.

Objective: (1) Quiz A

123) Scores on the Wechsler Adult Intelligence Scale — Revised (WAIS-R) follow a Normal model with mean 100 and standard deviation 15. Draw and clearly label this model.



Objective: (1) Quiz A

124) Adult female Dalmatians weigh an average of 50 pounds with a standard deviation of 3.3 pounds. Adult female Boxers weigh an average of 57.5 pounds with a standard deviation of 1.7 pounds. One statistics teacher owns an underweight Dalmatian and an underweight Boxer. The Dalmatian weighs 45 pounds, and the Boxer weighs 52 pounds. Which dog is more underweight? Explain.

Objective: (1) Quiz A

125) Human body temperatures taken through the ear are typically 0.5°F higher than body temperatures taken orally. Making this adjustment and using the 1992 *Journal of the American Medical Association* article that reports average oral body temperature as 98.2°F, we will assume that a Normal model with an average of 98.7°F and a standard deviation of 0.7°F is appropriate for body temperatures taken through the ear.

a. An ear temperature of 97°F may indicate hypothermia (low body temperature). What percent of people have ear temperatures that may indicate hypothermia?

b. Find the interquartile range for ear temperatures.

c. A new thermometer for the ear reports that it is more accurate than the ear thermometers currently on the market. If the average ear temperature reading remains the same and the company reports an IQR of 0.5°F, find the standard deviation for this new ear thermometer.

Objective: (1) Quiz A

126) During a budget meeting, local school board members decided to review class size information to determine if budgets were correct. Summary statistics are shown in the table.

$\bar{x}$	33.39 students
s	5.66 students
min	17
Q1	29
median	33
Q3	40
max	40

a. Notice that the third quartile and maximum class sizes are the same. Explain how this can be.

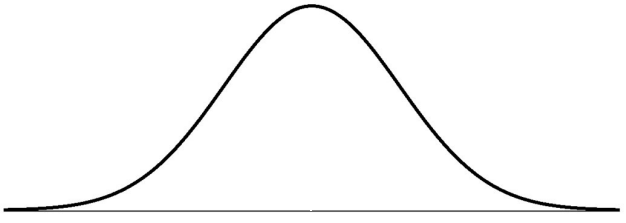
b. The school district declares that classes with enrollments fewer than 20 students are "too small." Would you consider a class of 20 students to be unusually small? Explain.

c. The school district sets the office supply budgets of their high schools on the enrollment of students. The district budgets each class $12 plus $0.75 per student, so a class with one student receives $12.75 and the classes with 40 students receive 12 + 0.75(40) = $42. What is the median class budget for office supplies? And the IQR?

d. What are the mean and standard deviation of the class office supply budgets?

Objective: (2) Quiz B

127) The Postmaster of a city's Post Office believes that a Normal model is useful in projecting the number of letters which will be mailed during the day. They use a mean of 20,000 letters and a standard deviation of 250 letters. Draw and clearly label this model.



Objective: (2) Quiz B

128) Light bulbs are measured in lumens (light output), watts (energy used), and hours (life). A standard white light bulb has a mean life of 675 hours and a standard deviation of 50 hours. A soft white light bulb has a mean life of 700 hours and a standard deviation of 35 hours. At a local science competition, both light bulbs lasted 750 hours. Which light bulb's life span was better? Explain.

Objective: (2) Quiz B

129) At a large business, employees must report to work at 7:30 A.M. The arrival times of employees can be described by a Normal model with mean of 7:22 A.M. and a standard deviation of 4 minutes.

a. What percent of employees are late on a typical work day? (SHOW WORK)

b. A psychological study determined that the typical worker needs five minutes to adjust to their surroundings before beginning their duties. What percent of this business' employees arrive early enough to make this adjustment?

c. Because late employees are a distraction and cost companies money, all employees need to be on time to work. If the mean arrival time of employees does not change, what standard deviation would the arrival times need to ensure virtually all employees are on time to work?

d. Explain what achieving a smaller standard deviation means in the context of this problem.

Objective: (2) Quiz B

130) A vendor offers various t-shirts for sale on an Internet commerce site. Some of his t-shirts sell quite well, others have yet to find an interested customer. The summary statistics are listed on right, based on the number of sales per month for each of 80 different t-shirt designs.

$\bar{x}$	23
Median	15
Min	0
Q1	3
Q3	21
Max	82
sd	7.84

a. What is the shape of this distribution? Explain how you know.

b. If the vendor spends $2 per t-shirt in shipping costs, what is his average monthly costs per t-shirt sold? What is the standard deviation of this cost? Show work.

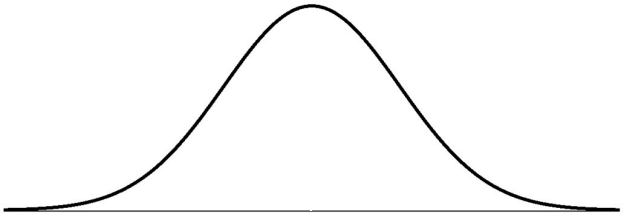
c. As time passes, the vendor has simplified his profit calculation. He estimates that he has monthly flat costs of $35, with a gain of $3.50 per t-shirt sold. What is the median of his profit? The IQR?

d. What are the mean and standard deviation of his profit?

e. What is more appropriate in this case: using mean and standard deviation, or using median and IQR?

Objective: (3) Quiz C

131) Owners of a minor league baseball team believe that a Normal model is useful in projecting the number of fans who will attend home games. They use a mean of 8500 fans and a standard deviation of 1500 fans. Draw and clearly label this model.



Objective: (3) Quiz C

132) Although most of us buy milk by the quart or gallon, farmers measure daily production in pounds. Guernsey cows average 39 pounds of milk a day with a standard deviation of 8 pounds. For Jerseys the mean daily production is 43 pounds with a standard deviation of 5 pounds. When being shown at a state fair a champion Guernsey and a champion Jersey each gave 54 pounds of milk. Which cow's milk production was more remarkable? Explain.

Objective: (3) Quiz C

133) A company's manufacturing process uses 500 gallons of water at a time. A "scrubbing" machine then removes most of a chemical pollutant before pumping the water into a nearby lake. Legally the treated water should contain no more than 80 parts per million of the chemical, but the machine isn't perfect and it is costly to operate. Since there's a fine if the discharged water exceeds the legal maximum, the company sets the machine to attain an average of 75 ppm for the batches of water treated. They believe the machine's output can be described by a Normal model with standard deviation 4.2 ppm. (SHOW WORK)

a. What percent of the batches of water discharged exceed the 80ppm standard?
b. The company's lawyers insist that they not have more than 2% of the water over the limit. To what mean value should the company set the scrubbing machine? Assume the standard deviation does not change.
c. Because achieving a mean that low would raise the costs too much, they decide to leave the mean set at 75 ppm and try to reduce the standard deviation to achieve the "only 2% over" goal. Find the new standard deviation needed.
d. Explain what achieving a smaller standard deviation means in this context.

Objective: (3) Quiz C

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

134) The ASQ (American Society for Quality) regularly conducts a salary survey of its membership, primarily quality management professionals. Based on the most recently published mean and standard deviation, a quality control specialist calculated the z-score associated with his own salary and found it was -2.50. This tells him that his salary is

A) much higher than the average salary.
B) 2 and a half times less than the average salary.
C) is 2.5 standard deviations above the average salary.
D) is 2.5 standard deviations below the average salary.
E) 2 and a half times more than the average salary.

Objective: (4) Quiz D

135) Adult female Dalmatians weigh an average of 50 pounds with a standard deviation of 3.3 pounds. Adult female Boxers weigh an average of 57.5 pounds with a standard deviation of 1.7 pounds. One statistics teacher owns an underweight Dalmatian and an underweight Boxer. The Dalmatian weighs 45 pounds, and the Boxer weighs 52 pounds. Which dog is more underweight?

A) The Dalmatian because it is 9.6% underweight.
B) The Dalmatian because it is 5 pounds underweight.
C) The Boxer because it is 5.5 pounds underweight.
D) The Boxer because it is 3.24 standard deviations underweight.
E) The Boxer because it is 9.6% underweight.

Objective: (4) Quiz D

136) Based on data collected from its production processes, Crosstiles Inc. determines that the breaking strength of its most popular porcelain tile is normally distributed with a mean of 400 pounds per square inch and a standard deviation of 12.5 pounds per square inch. Based on the 68-95-99.7 Rule, about what percent of its popular porcelain tile will have breaking strengths between 375 and 425 pounds per square inch?

A) 84% B) 47.5% C) 95% D) 32% E) 68%

Objective: (4) Quiz D

137) Based on data collected from its production processes, Crosstiles Inc. determines that the breaking strength of its most popular porcelain tile is normally distributed with a mean of 400 pounds per square inch and a standard deviation of 12.5 pounds per square inch. Based on the 68-95-99.7 Rule, about what percent of its popular porcelain tile will have breaking strengths greater than 412.5 pounds per square inch?

A) 32% B) 16% C) 68% D) 47.5% E) 95%

Objective: (4) Quiz D

138) At a local manufacturing plant, employees must complete new machine set ups within 30 minutes. New machine set-up times can be described by a normal model with a mean of 22 minutes and a standard deviation of four minutes. What percent of new machine set ups take more than 30 minutes?

A) 52.28%
B) 97.72%
C) 47.72%
D) 2.28%
E) none of the above

Objective: (4) Quiz D

139) At a local manufacturing plant, employees must complete new machine set ups within 30 minutes. New machine set-up times can be described by a normal model with a mean of 22 minutes and a standard deviation of four minutes. The typical worker needs five minutes to adjust to his or her surroundings before beginning duties. What percent of new machine set ups are completed within 25 minutes to allow for this?

A) 22.7%
B) 27.3%
C) 77.3%
D) 72.7%
E) none of the above

Objective: (4) Quiz D

140) Both SAT and ACT are well-known placement tests that most US colleges require from prospective students to be admitted in their programs. Scores in the SAT test are approximately normally distributed with a mean of 500 and a standard deviation of 100. Scores in the ACT test are approximately normally distributed with a mean of 18 and a standard deviation of 6. What would be the score in the SAT test to get the same z-score as the admission requirement of an ACT score of 27?

A) 500 B) 550 C) 600 D) 700 E) 650

Objective: (4) Quiz D

141) The distribution of the diameters of a particular variety of grapes is approximately normal with a standard deviation of 0.3 cm. How does the diameter of a grape at the 67th percentile compare with the mean diameter?

A) 0.132 cm above the mean
B) 0.201 cm above the mean
C) 0.201 cm below the mean
D) 0.132 cm below the mean
E) 0.254 cm above the mean

Objective: (4) Quiz D

142) A soft drink dispenser can be adjusted to deliver any fixed number of centiliters. If the machine is operating with a standard deviation in delivery equal to 0.3 centiliter, what should be the mean setting so that a 12-centiliter cup will overflow less than 1% of the time? Assume a normal distribution for centiliters delivered.

A) 11.23 B) 12.00 C) 12.70 D) 11.70 E) 11.30

Objective: (4) Quiz D

143) Suppose that the weights of vans delivering goods to inner city shops are normally distributed. If 70% of the vans weigh more than 1200 kg, and 80% weigh more than 1000 kg, what are the mean and standard deviation for the weights of vans serving the inner city (round to tens)?
A) μ = 1530 kg; σ = 640 kg
B) μ = 1530 kg; σ = 630 kg
C) μ = 1510 kg; σ = 620 kg
D) μ = 1550 kg; σ = 640 kg
E) There is not enough information given to determine the mean and standard deviation.
Objective: (4) Quiz D

144) Suppose that a Normal model describes the acidity (pH) of rainwater, and that water tested after last week's storm had a z-score of 1.8. This means that the acidity of that rain
A) had a pH 1.8 higher than average rainfall.
B) had a pH 1.8 times that of average rainwater.
C) had a pH 1.8 standard deviations higher than that of average rainwater.
D) had a pH of 1.8.
E) varied with a standard deviation of 1.8.
Objective: (5) Quiz E

145) Light bulbs are measured in lumens (light output), watts (energy used), and hours (life). A standard white light bulb has a mean life of 675 hours and a standard deviation of 50 hours. A soft white light bulb has a mean life of 700 hours and a standard deviation of 35 hours. At a local science competition, both light bulbs lasted 750 hours. Which light bulb's life span was better?
A) The soft white light bulb because it is 7% beyond the mean.
B) The soft white light bulb because it is 50 hours beyond the mean.
C) The standard white light bulb because it is 11% beyond the mean.
D) The standard light bulb because it lasted 1.5 standard deviations above the mean life.
E) The standard white light bulb because it is 75 hours beyond the mean.
Objective: (5) Quiz E

146) The time it takes to process phone orders in a small florist/gift shop is normally distributed with a mean of 6 minutes and a standard deviation of 1.24 minutes. What cutoff value would separate the 2.5% of orders that take the most time to process?
A) 10.01 minutes
B) 8.48 minutes
C) 4.76 minutes
D) 11.98 minutes
E) 3.52 minutes
Objective: (5) Quiz E

147) The time it takes to process phone orders in a small florist/gift shop is normally distributed with a mean of 6 minutes and a standard deviation of 1.24 minutes. What cutoff values would separate the 16% of orders that take the least time to process?
A) 8.48 minutes
B) 11.98 minutes
C) 10.01 minutes
D) 3.52 minutes
E) 4.76 minutes
Objective: (5) Quiz E

148) A small flower shop takes orders by phone and then one of the staff florists is assigned to prepare the arrangement. The time it takes to process phone orders is normally distributed with a mean of 6 minutes and a standard deviation of 2.5 minutes. The time it takes for an arrangement to be completed is normally distributed with a mean of 35 minutes and a standard deviation of 8.6 minutes. What is the standard deviation for the total time to process a phone order and complete the floral arrangement at this flower shop (assuming times are independent)?

A) 80.28 minutes
B) 4.87 minutes
C) 12.43 minutes
D) 8.96 minutes
E) 41 minutes

Objective: (5) Quiz E

149) A small flower shop takes orders by phone and then one of the staff florists is assigned to prepare the arrangement. The time it takes to process phone orders is normally distributed with a mean of 6 minutes and a standard deviation of 2.5 minutes. The time it takes for an arrangement to be completed is normally distributed with a mean of 35 minutes and a standard deviation of 8.6 minutes. What is the probability that it will take more than 50 minutes to process a phone order and complete the floral arrangement at this flower shop?

A) 0.3413 B) 0.6843 C) 0.1587 D) 0.8413 E) 0.2167

Objective: (5) Quiz E

150) A company's manufacturing process uses 500 gallons of water at a time. A "scrubbing" machine then removes most of a chemical pollutant before pumping the water into a nearby lake. To meet federal regulations the treated water must not contain more than 80 parts per million (ppm) of the chemical. Because a fine is charged if regulations are not met, the company sets the machine to attain an average of 75 ppm in the treated water. The machine's output can be described by a normal model with standard deviation 4.2 ppm. What percent of the batches of water discharged exceed the 80 ppm standard?

A) 8.83% B) 88.3% C) 1.17% D) 3.89% E) 11.7%

Objective: (5) Quiz E

151) A company's manufacturing process uses 500 gallons of water at a time. A "scrubbing" machine then removes most of a chemical pollutant before pumping the water into a nearby lake. To meet federal regulations the treated water must not contain more than 80 parts per million (ppm.) of the chemical. The machine's output can be described by a normal model with standard deviation 4.2 ppm. The company's lawyers insist that not more than 2% of the treated water should be over the limit. To achieve this, to what mean should the company set the scrubbing machine?

A) 88.626 ppm B) 69.459 ppm C) 80 ppm D) 71.374 ppm E) 75 ppm

Objective: (5) Quiz E

152) Suppose that a Normal model describes fuel economy (miles per gallon) for automobiles and that a Toyota Corolla has a standardized score (z-score) of +2.2. This means that Corollas

A) get 2.2 mpg more than the average car.
B) get 2.2 times the gas mileage of the average car.
C) get 2.2 miles per gallon.
D) have a standard deviation of 2.2 mpg.
E) achieve fuel economy that is 2.2 standard deviations better than the average car.

Objective: (5) Quiz E

153) Based on the Normal model for yearly snowfall in cm in a certain town N(57, 8), how many cm's of snow would represent the 80th percentile approximately?

A) 63.3 cm B) 64.5 cm C) 62.7 cm D) 63.7 cm E) 61.7 cm

Objective: (5) Quiz E

154) School administrators collect data on students attending the school. Which of the following variables is quantitative?

A) class (freshman, soph., junior, senior)
B) whether the student is in AP* classes
C) whether the student has taken the SAT
D) grade point average
E) none of these

Objective: (1) Test A

155) Which of the following variables would most likely follow a Normal model?

A) heights of singers in a co-ed choir
B) family income
C) weights of adult male elephants
D) scores on an easy test
E) all of these

Objective: (1) Test A

156) 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) histogram
B) pie chart
C) boxplot
D) stem and leaf plot
E) dotplot

Objective: (1) Test A

157) The weight of an Eurasian water shrew has a mean of 0.55 oz., a standard deviation of 0.06 oz., and is approximately normal. If a researcher captures a shrew whose weight is 0.59 oz., what percentile is its weight?

A) 75% B) 25% C) 67% D) 33% E) 4%

Objective: (1) Test A

158) 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) 85.0
B) 84.3
C) 85.7
D) none of these
E) It cannot be determined.

Objective: (1) Test A

159) Data is collected on the number of movies 18-34 year olds go see in a year. In the random sample of 250 people 23% respond that they have seen 10 or more movies. Which of the following statements are TRUE?
I. Because the sample is random, 23% is the right answer.
II. If you took more samples of size 250, this percentage would be slightly different.
III. The right answer is probably close to 23% but other random samples will produce slightly different results.
A) none of these B) II and III C) II only D) III only E) I only
Objective: (1) Test A

160) Suppose that a Normal model described student scores in a history class. Parker has a standardized score (*z*-score) of +2.5. This means that Parker
A) has a standard deviation of 2.5.
B) has a score that is 2.5 times the average for the class.
C) is 2.5 points above average for the class.
D) is 2.5 standard deviations above average for the class.
E) None of the above
Objective: (1) Test A

161) The advantage of making a stem-and-leaf display instead of a dotplot is that a stem-and-leaf display
A) shows the shape of the distribution better than a dotplot.
B) satisfies the area principle.
C) preserves the individual data values.
D) A stem-and-leaf display is for quantitative data, while a dotplot shows categorical data.
E) none of these
Objective: (1) Test A

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

Min	Q1	Median	Q3	Max
13.0	15.0	16.5	18.0	22.0

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.
Objective: (1) Test A

163) 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) I, II, and III B) I and III C) III only D) I and II E) I only
Objective: (1) Test A

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

164) Cats and dogs The table shows whether students in an introductory statistics class like dogs and/or cats.

		Like Dogs		
		Yes	No	Total
Like Cats	Yes	194	21	215
	No	100	20	120
	Total	294	41	335

a. Make a graphical display that shows the relationships in this table.
b. What is the marginal distribution (in %) of "liking dogs"?
c. What is the conditional distribution (in %)
of "liking dogs" for students who like cats?
d. What kind of display(s) would you use to examine the association
between "liking dogs" and "liking cats"? (Just name a graph.)
e. Do "liking dogs" and "liking cats" appear to be independent? Give statistical evidence to support your conclusion.

Objective: (1) Test A

165) House calls A local plumber makes house calls. She charges $30 to come out to the house and $40 per hour for her services. For example, a 4-hour service call costs $30 + $40(4) = $190.
a. The table shows summary statistics for the past month. Fill in the table to find out the cost of the service calls.

Statistic	Hours of Service Call	Cost of Service Call
Mean	4.5	
Median	3.5	
SD	1.2	
IQR	2.0	
Minimum	0.5	

b. This past month, the time the plumber spent on one service call corresponded to a z-score of - 1.50. What was the z-score for the cost of that service call?

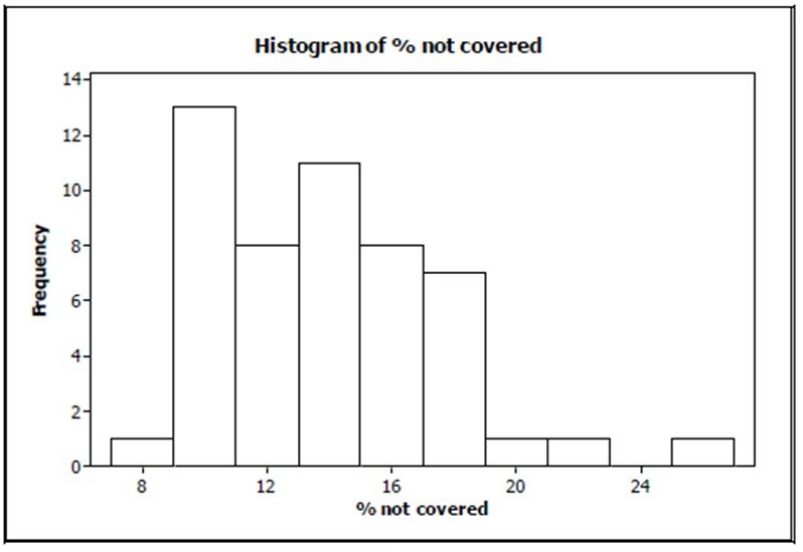
Objective: (1) Test A

166) Health insurance 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:

Min	Q1	Median	Q3	Max	Mean	SD
7.9	10.8	13.4	16.7	25.8	13.9	3.6

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

b. A histogram of the data is as follows:

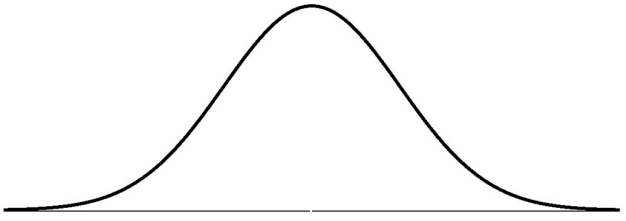


Is it more appropriate to use the mean and standard deviation or the median and IQR to describe these data? Explain.

Objective: (1) Test A

167) Veterinary costs Costs for standard veterinary services at a local animal hospital follow a Normal model with a mean of $80 and a standard deviation of $20.

a. Draw and clearly label this model.



b. Is it unusual to have a veterinary bill for $125? Explain.

c. What is the IQR for the costs of standard veterinary services? Show your work.

Objective: (1) Test A

168) Soda cans A machine that fills cans with soda fills according to a Normal model with mean 12.1 ounces and standard deviation 0.05 ounces.

a. If the cans claim to have 12 ounces of soda each, what percent of cans are under-filled?

b. Management wants to ensure that only 1% of cans are under-filled.

i. Scenario 1: If the mean fill of the cans remains at 12.1 ounces, what standard deviation does the filling machine need to have to achieve this goal?

ii. Scenario 2: If the standard deviation is to remain at 0.05 ounces, what mean does the filling machine need to have to achieve this goal?

Objective: (1) Test A

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

169) The SPCA collects the following data about the dogs they house. Which is categorical?

A) number of days housed
B) veterinary costs
C) weight
D) breed
E) age

Objective: (2) Test B

170) Which of those variables about German Shepherds is most likely to be described by a Normal model?

A) veterinary costs
B) breed
C) age
D) number of days housed
E) weight

Objective: (2) Test B

171) The SPCA has kept these data records for the past 20 years. If they want to show the distribution of the preferred breed of dog that people choose, which graph would they choose?

A) bar graph
B) dotplot
C) histogram
D) stem and leaf plot
E) boxplot

Objective: (2) Test B

172) A researcher notes that the weight of a male Golden Retriever is approximately normally distributed with a mean of 70 lbs. and a standard deviation of 7.5 lbs. What percentage of these dogs weigh less than 65 lbs?

A) 5% B) 33.3% C) 66.7% D) 75% E) 25%

Objective: (2) Test B

173) Referring to question #4, approximately how heavy would a male Golden Retriever be in order to be in the heaviest 5% of such dogs?

A) 82 lbs. B) 84 lbs. C) 65 lbs. D) 68 lbs. E) 75 lbs.

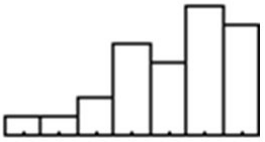
Objective: (2) Test B

174) 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) 68 mph
B) 67 mph
C) 69 mph
D) none of those
E) It cannot be determined.

Objective: (2) Test B

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

Objective: (2) Test B

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

Objective: (2) Test B

177) Consider the five number summary for salaries of U.S. marketing managers.

Min	Q1	Median	Q3	Max
46360	69693	77020	91750	129420

Suppose the marketing manager who was earning $129,420 got a raise and is now earning $140,000. Which of the following statement is TRUE?

A) The mean would increase.
B) The median would increase.
C) The range would increase.
D) Both A and C.
E) All of the above.

Objective: (2) Test B

178) Suppose that a Normal model describes fuel economy (miles per gallon) for automobiles and that a Toyota Corolla has a standardized score (z-score) of +2.2. This means that Corollas

A) achieve fuel economy that is 2.2 standard deviations better than the average car.
B) get 2.2 times the gas mileage of the average car.
C) get 2.2 mpg more than the average car.
D) get 2.2 miles per gallon.
E) have a standard deviation of 2.2 mpg.

Objective: (2) Test B

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

179) Commuting to work The table shows how a company's employees commute to work.

	Transportation			
Job Class	Car	Bus	Train	Total
Management	26	20	44	90
Labor	56	106	168	330
Total	82	126	212	420

a. What is the marginal distribution (in %) of mode of transportation?
Car _____ Bus _____ Train _____
b. What is the conditional distribution (in %) of mode of transportation for management?
Car _____ Bus _____ Train _____
c. What kind of display would you use to show the association between job class and mode of transportation? (Just name a graph.)
d. Do job classification and mode of transportation appear to be independent? Give statistical evidence to support your conclusion.

Objective: (2) Test B

180) Book sales A publishing company pays its sales staff $600 a week plus a commission of $0.50 per book sold. For example, a salesman who sold 440 books earned 600 + 0.50(440) = $820.

Statistic	Books Sold	$ Earned
Mean	640	
St. dev.	360	
IQR	450	
Maximum	1420	

a. The table shows summary statistics for the number of books the large sales staff sold last week. Fill in the table to show the statistics for the pay these people earned.
b. The newest employee had a pretty good week. Among all the salespeople her pay corresponded to a z-score of +1.80. What was the z-score of the number of books she sold?

Objective: (2) Test B

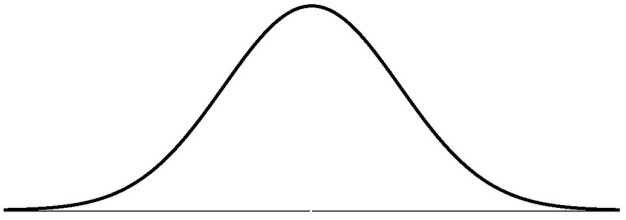
181) Cordless phones In their October 2003 issue, *Consumer Reports* evaluated the price and performance of 23 models of cordless phones. Computer output gives these summaries for the prices:

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

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

Objective: (2) Test B

182) Exercising Owners of an exercise gym believe that a Normal model is useful in projecting the number of clients who will exercise in their gym each week. They use a mean of 800 clients and a standard deviation of 90 clients.
a. Draw and clearly label this model.



b. What is the first quartile of the weekly number of clients? (SHOW WORK)
c. An owner of another gym reports that 5% of the time their gym has fewer than 450 clients, and 40% of the time the gym has more than 1085 clients. What parameters should that owner use for his Normal model?
N(_____, _____)

Objective: (2) Test B

183) Concrete thickness A roadway construction process uses a machine that pours concrete onto the roadway and measures the thickness of the concrete so the roadway will measure up to the required depth in inches. The concrete thickness needs to be consistent across the road, but the machine isn't perfect and it is costly to operate. Since there's a safety hazard if the roadway is thinner than the minimum 23 inch thickness, the company sets the machine to average 26 inches for the batches of concrete. They believe the thickness level of the machine's concrete output can be described by a Normal model with standard deviation 1.75 inches. (Show work)
a. What percent of the concrete roadway is under the minimum depth?
b. The company's lawyers insist that no more than 3% of the output be under the limit. Because of the expense of operating the machine, they cannot afford to reset the mean to a higher value. Instead they will try to reduce the standard deviation to achieve the "only 3% under" goal. What standard deviation must they attain?
c. Explain what achieving a smaller standard deviation means in this context.

Objective: (2) Test B

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

184) We collect these data from 50 male students. Which variable is categorical?
A) eye color
B) number of cigarettes smoked daily
C) head circumference
D) hours of homework last week
E) number of TV sets at home

Objective: (3) Test C

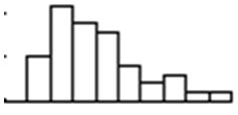
185) Which of those variables is most likely to follow a Normal model?
A) number of cigarettes smoked daily
B) eye color
C) head circumference
D) hours of homework last week
E) number of TV sets at home
Objective: (3) Test C

186) The data collected in a recent (2012) Nielsen Global Survey analyzed Asian American demographics. Which of the following statements is (are) TRUE?
A) Education level is a categorical variable.
B) Education level is nominal scaled.
C) Education level is ordinal scaled.
D) Both A and B
E) Both A and C
Objective: (3) Test C

187) 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 7.5.
B) is 6.5.
C) is 7.2.
D) is none of these.
E) cannot be determined.
Objective: (3) Test C

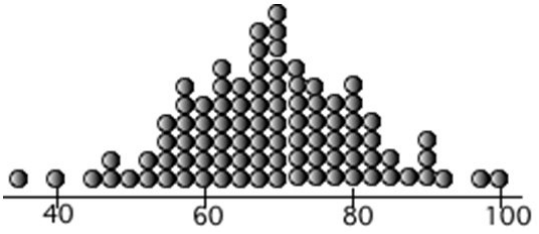
188) We might choose to display data with a stemplot rather than a boxplot because a stemplot
I. reveals the shape of the distribution.
II. is better for large data sets.
III. displays the actual data.
A) I only B) II only C) III only D) I and III E) I, II, and III
Objective: (3) Test C

189) 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) I only B) II only C) I and II D) II and III E) I, II, and III
Objective: (3) Test C

190) The standard deviation of the data displayed in this dotplot is most likely to be



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

Objective: (3) Test C

191) Suppose that a Normal model describes the acidity (pH) of rainwater, and that water tested after last week's storm had a *z*-score of 1.8. This means that the acidity of that rain

A) had pH 1.8 standard deviations higher than average rainwater.
B) had pH 1.8 times that of average rainwater.
C) had pH 1.8 higher than avg, rainfall.
D) varied with a st. dev. of 1.8
E) had pH of 1.8.

Objective: (3) Test C

192) A North American mole weighs an average of 3.5 oz. with a standard deviation of 0.9 oz. and a distribution that is approximately normal. In what percentile is the weight of a mole that weighs 4.25 oz.?

A) 79.8% B) 17.7% C) 83.3% D) 20.2% E) 6.022%

Objective: (3) Test C

193) Environmental researchers have collected rain acidity data. They want to examine the various causes of the acidity. They should graph their data with a

A) stem and leaf plot.
B) histogram.
C) boxplot.
D) dotplot.
E) bar graph.

Objective: (3) Test C

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

194) Paying for purchases One day a store tracked the way shoppers paid for their purchases. Their data are summarized in the table.

	Cash	Check	Charge	Total
Male	18	10	12	40
Female	18	12	30	60
Total	36	22	42	10

a. What percent of men paid cash?
b. What is the conditional relative frequency distribution of payment method for women?
c. If you wanted to show the association between gender and method of payment visually, what kind of graph would you make? (Just name it.)
d. Is there evidence of an association between gender and method of payment? Explain briefly.

Objective: (3) Test C

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

Min	27
Q1	88
Median	132
Q3	308
Max	1442
Mean	284
SD	140

a. Were any of the bills outliers? Show how you made your decision.

b. 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.

Objective: (3) Test C

196) Salary conversions You learn that your company is sending you and several other employees to staff a new office in China. While there everyone will earn the equivalent of their current salary, converted to Chinese currency at the rate of 8 yuans per dollar. In addition, everyone will earn a weekly foreign living allowance of 200 yuans. For example, since you are earning $1000 per week, your weekly salary in China will be 1000 x 8 + 200 = 8200 yuans.

Statistic	In the US	In China
Minimum salary	$400	
Standard deviation	$250	
Median	$750	
IQR	$300	

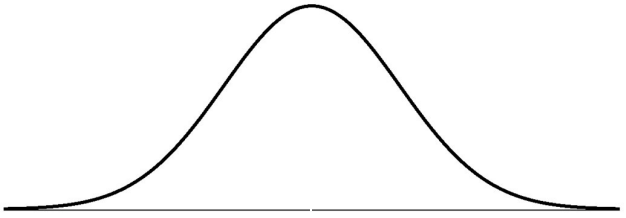
a. Shown are some summary statistics describing the current salaries of this group being sent overseas. Fill in the table to show what these statistics will be for the salaries you all will earn while in China.

b. Among this group of employees going to China, your US salary has a z-score of +1.20. What will your new z-score be, based on everyone's China salary?

Objective: (3) Test C

197) Copy machines A manufacturer claims that lifespans for their copy machines (in months) can be described by a Normal model $N(42,7)$. Show your work.

a. Draw and clearly label the model.



b. A company with a several large office buildings buys 200 of these copiers. The salesman tells the boss "190 (95%) of your new copiers will last between _____ and _____ months." Comment on this claim.

c. What is the 3rd quartile of copier lifespans?

d. What percent of the copiers are expected to fail before 36 months?

e. The manufacturer wants to reduce the 36-month failure rate to only 10%. Assuming the mean lifespan will stay the same, what standard deviation must they achieve?

f. Briefly explain what that change in standard deviation means in this context.

g. A competing manufacturer says that not only will 90% of their copiers last at least 36 months, 65% will last at least 42 months. What Normal model parameters is that manufacturer claiming? Show your work.

N(_____, _____)

Objective: (3) Test C

1) • Who: 8th, 10th, and 12th graders
• What: alcohol, illegal drug, and cigarette use
• When: Spring 2016
• Where: United States
• How: survey
• Why: "to study changes in the beliefs, attitudes, and behavior of young people in the United States"

2) Categorical: sex, only child?, major
Quantitative: age (years), height (inches), weight (pounds), credit hours, GPA

3) • Who: Colonies of ants. "Many species of ants," but no indication of exactly how many.
• What: scientific name, geographic location, average nest depth, average number of chambers, average colony size, how new ant colonies begin, the ant-nest design, and how nests differ in architecture.
• When: November 2003
• Where: not specified
• How: The results of some discoveries found by myrmecologist Walter Tschinkel of the University of Florida
• Why: Information of interest to readers of the magazine

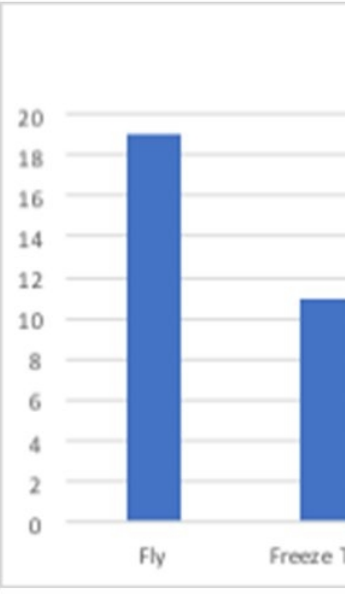
4) Categorical: species, geographic location, how new ant colonies begin, and nest design.
Quantitative: nest depth (feet), number of chambers (units), and colony size (units).

5) • Who: 11 wireless in-ear headphones.
• What: brand, price, battery life, audio quality, ease of setup, and other characteristics.
• When: May 2017
• Where: not specified, probably the United States
• How: presumably lab tests of the 11 models
• Why: information for potential consumers

6) Categorical: brand, audio quality, ease of setup
Quantitative: price (US$), battery life (probably hours)

7) E
8) B
9) E
10) C
11) D
12) E
13) B
14) A
15) E
16) A
17) E
18) B
19) D
20) A
21) C
22) E
23) E
24) D
25) A
26) A

27) a. Superpower

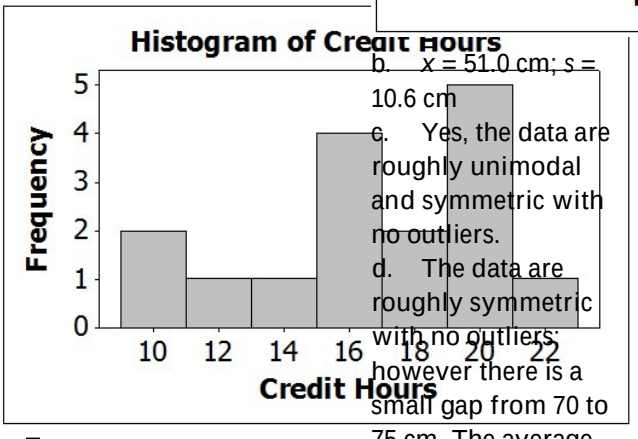


b. The ability to fly is the students' most popular choice, followed by telepathy and freeze time. Super strength is the least popular, with invisibility also not very popular.

28) a. No
b. Yes
c. No
d. Yes

29) If the reader of the graphs is going to understand the relationship between the groups, it is important that the area allotted to each group match the proportion of group in the sample. If an artist turns the bars into some kind of image, he might be not make each picture the proper area, and thus distort the actual percentage breakdown of each group.

30) a.



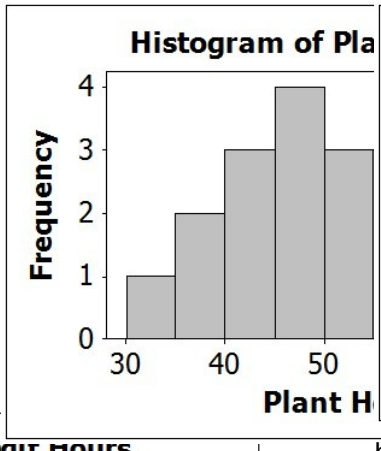
b. $\bar{x}$ = 16.3 credit hours; s = 3.7 credit hours

c. The median is 16.0 credit hours. IQR = Q3 - Q1 = 20 - 14.5 = 5.5 credit hours

d. It is more appropriate to use the median and IQR to summarize these data, because these data are not unimodal and symmetric.

31) a. increase
b. stay about the same
c. increase
d. stay about the same
e. increase

32) a.



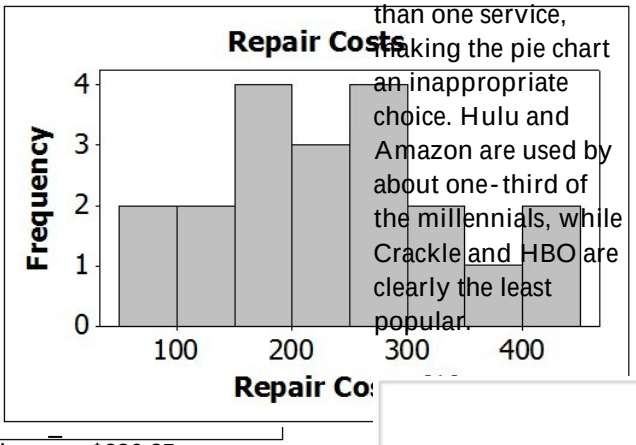
b. $\bar{x}$ = 51.0 cm; s = 10.6 cm

c. Yes, the data are roughly unimodal and symmetric with no outliers.

d. The data are roughly symmetric with no outliers; however there is a small gap from 70 to 75 cm. The average plant height is 51.0 centimeters, with a standard deviation of 10.6 centimeters. The range of plant heights is 43 centimeters. The distribution of plant heights has a mode between 45 and 49 centimeters.

33) a. increase
b. stay about the same
c. increase
d. stay about the same
e. increase

34) a.

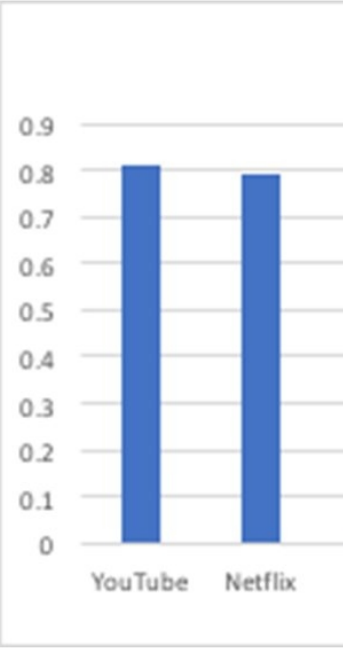


b. $\bar{x}$ = $236.25; s = $103.43

c. Yes, the data are roughly unimodal and symmetric with no outliers.

d. The repair costs averaged $236.25, ranging from $56 to $422 with a standard deviation of $103.43. The distribution was approximately symmetric, with typical repair costs clustered between $150 and $300.

35) YouTube and Netflix are clearly the dominant choices. And as these percentages add to more than 100%, it is clear that most millennials use more than one service, making the pie chart an inappropriate choice. Hulu and Amazon are used by about one-third of the millennials, while Crackle and HBO are clearly the least popular.



36) E
37) B
38) C
39) B
40) B
41) E
42) C
43) D
44) B
45) C
46) A

47) E
48) B
49) B
50) A
51) C
52) B
53) A
54) E
55) B
56) a. 56.9%
b. 38.9%
c. 41.1%
d. 60.0%
57) Yes: 56.9%; No: 43.1%
58) No. 56.9% of all young girls surveyed reported drinking milk, but 60% of the young girls reported drinking milk in the 1989-1991 survey. Since these percentages differ, milk consumption and year are not independent.
59) No. It looks like there is some sort of relationship between milk consumption and nationwide survey year, since the percentage of young girls who reported drinking milk is a larger slice of the pie chart for the 1989-1991 survey than the same response for the 1994-1996 survey.
60) Gender and Breed; both categorical.
61) We do not know how or when the people were surveyed, or where the local dog show was located.
62) a. 6.6%
b. 14.9%
c. 52.6%
63) There were 132 Yorkshire terrier responses, 96 Dachshund responses, 91 Golden Retriever responses, 78 Labrador responses, 73 Dalmatian responses, and 153 Other responses.
64) Among females, 21.0% chose Yorkshire Terriers, 14.1% Dachshunds, 16.7% Golden Retrievers, 10.6% Labs, and 12.9% Dalmatians. The remaining 24.7% of females preferred other breeds.
65) The breed selection does not appear to be independent of gender. Overall, 56% of the respondents were females, but females were over-represented among those who favored Golden Retrievers (64%) and Dalmatians (62%), yet a much lower percentage (47%) among those who chose Labradors.
66) Gender and mode of transportation, both categorical.
67) We don't know how or when the students were surveyed, nor where the school is.
68) a. 18.1%
b. 33.3%
c. 53.1%
69) There are 86 males and 102 females.
70) The way students get to school does seem to be independent of gender. Overall, 34% of students ride the bus, compared to 35% of the boys and 33% of the girls. 44% of all students caught rides with someone and 22% used personal transportation, almost the same as the percentages for boys (43% and 22%) or girls (44% and 23%) separately. These data provide little indication of a difference in mode of transportation between boys and girls at this school.
71) While gender is independent of mode of transportation, it might be that distance from school is a more important factor. This could further affect the Why? of the analysis. Is the student body changing over time? More students enrolling from a closer or further distance? A mosaic plot could be added to examine all three variables at once.
72) D
73) C
74) C
75) A, B, D
76) B
77) D
78) C
79) B
80) E
81) E
82) E
83) A
84) D
85) D
86) C
87) C
88) E
89) C
90) A
91) A, C
92) a. The mean midterm scores of all students would probably be lower than the median. Using the 5-number summary, it appears that the data are skewed to the left.
b. IQR = 43.5 - 32 = 11.5
Q1 - 1.5IQR = 32 - 1.5(11.5) = 14.75
Q3 + 1.5IQR = 43.5 +1.5(11.5) = 60.75
Since both the maximum and minimum scores fall between these "fences," there are not outliers in this data set.

93) a. The junior class had the lowest cumulative GPA, around 1.6.
b. The sophomore class had the highest median cumulative GPA, around 3.2.
c. The junior class had the largest range for GPA, about 2.4.
d. The senior class had the most symmetric set of GPAs. The sophomore class had the most skewed set of GPAs, skewed to the left.

94) Both distributions are unimodal and roughly symmetric. The male distribution appears to be centered around 165 cm, the female is lower at around 155 cm. The heights for the males appear to be more spread out than those for the females.

95) The taller males will increase the mean of the distribution. This effect on the mean will pull the mean slightly higher than the median.

96) a. The five-number summary provides mixed evidence. The right whisker is longer than the left whisker, suggesting some skewness to the right. But the right box is shorter than the left box. The mean temperature of all students may be somewhat higher than the median, but the effect is not clear.
b. IQR = 98.6° - 97.85° = 0.75°. Since 1.5(IQR) = 1.125°, the fences are 97.85° - 1.125° = 96.725° and 98.6° + 1.125° = 99.725°. The lowest temperature (96.7°) being added to the data set is smaller than the lower fence (96.725°) so it is an outlier on the low end. The highest temperature (99.2°) being added to the data set is not above the upper fence (99.725°) so it is not an outlier on the high end. All these calculations do not include the three additional observations in finding the descriptive statistics.

97) a. Passenger, less than 1 year.
b. Passenger, 21 yrs
c. Cyclist, 40 yrs
d. Pedestrian, 44 yrs
e. Pedestrian.
While the oldest person involved in an accident is not a pedestrian, the median age for pedestrians is almost 45 years, while the median age in the other groups are between 22 and 35 years old. The oldest 50% of the Pedestrian group, from 45 to 87 years, is generally older than the youngest 75% of two groups — Cyclist and Passenger, and only the Driver group has any of its middle 50% as old. The driver and passenger groups have a few people older than the pedestrian group.

98) The distributions of high school GPA for both males and females are skewed to the left, and both distributions appear to be centered at a GPA of about 3.0. The distribution of male GPA appears slightly more spread out than the distribution of female GPA.

99) a. Probably higher. The data appear to be skewed to the right.
b. IQR = 3.3 - 2.8 = 0.5. Since 1.5(IQR) = 0.75, the fences are 2.8 - 0.75 = 2.05 and 3.3 + 0.75 = 4.05. The fish weighing 4.2 pounds is more than 1.5 IQRs outside the quartiles, so it could be considered an outlier.

100) a. Car Z:$5000
b. BuyIt:$10,000
c. Ace: $10,000
d. CarZ:$3000
e. BuyIt; half of their cars are cheaper than any of the cars at Ace, and 25% of their cars are cheaper than all but one car at CarZ. The third quartile of their prices is well below the third quartile at CarZ, and below even the median price at Ace.

101) The Census Bureau projects dramatic changes in the female population of Mexico over the next 50 years. The current distribution of ages is strongly skewed to the right with most of the women under 30 and far fewer 50 and above. By 2050 the population will become more uniform across age groups from 0 to 60, and we anticipate an unusually large number of women over 80.

102) D

103) D

104) E

105) B

106) B

107) A

108) A

109) E

110) B

111) A, B, C

112) B

113) E

114) A, C

115) A, C, E

116) A, C

117) C

118) D

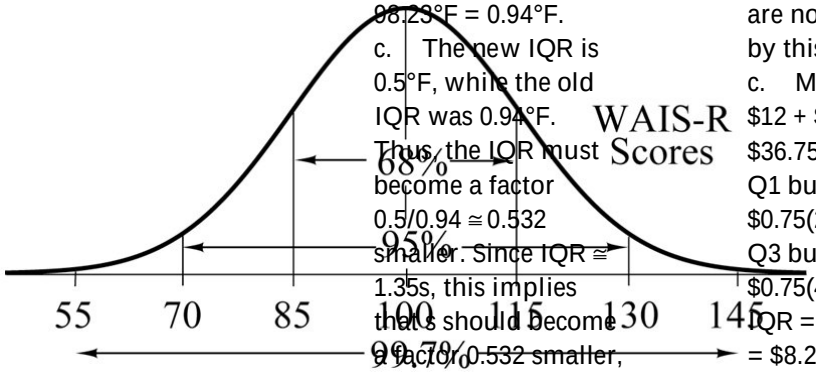
119) D

120) D

121) A

122) a.
i. $35 + $73(16.65) = $1250.45
ii. $73(2.96) = $216.08
iii. $35 + $73(16) = $1203
iv. IQR = 73(19-15) = $292
b. IQR = 19 - 15 = 4 credit hours
High outliers will lie above Q3 + 1.5IQR = 19 + 1.5(4) = 25 credit hours. Since 28 credit hours exceeds 25 credit hours, I would consider 28 credit hours to be unusually high.

123)



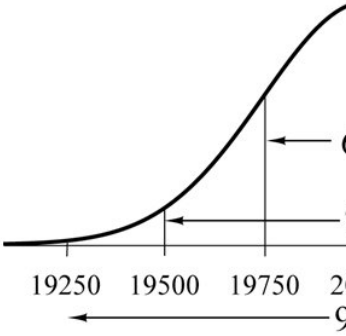
124) Dalmatian: z_D = (45-50)/3.3 ≅ -1.52
Boxer: z_B = (52-57.5)/1.7 ≅ -3.24

The Dalmatian is 1.52 standard deviations underweight, while the Boxer is 3.24 standard deviations underweight. So, the Boxer is more underweight.

125) a. Z = (97-98.7)/0.7 ≅ -2.43, so P(z<-2.43) ≅ 0.0075
About 0.75% of people have ear temperatures that may indicate hypothermia.
b. The *z*-scores associated with the IQR are *z* = -0.6745 and *z* = 0.6745. The temperatures corresponding to these z-scores are 98.7-0.6745*0.7 ≅ 98.23 and 98.7+0.6745*0.7 ≅ 99.17. The interquartile range is IQR = 99.17°F - 98.23°F = 0.94°F.
c. The new IQR is 0.5°F, while the old IQR was 0.94°F. Thus the IQR must become a factor 0.5/0.94 ≅ 0.532 smaller. Since IQR ≅ 1.35s, this implies that s should become a factor 0.532 smaller, or s ≅ 0.532*0.7 ≅ 0.372. Our new standard deviation is 0.37°F.

126) a. The top 25 percent of all classes have 40 students enrolled.
b. When using mean and standard deviation, classes with 20 students enrolled seem unusually small. Twenty is well below the first quartile of 29 students, and only slightly above the minimum size (17). With *z* = -2.366, this size class is over 2 standard deviation units below the mean. However, the distribution is far from bell shaped, since it is truncated at 1.14 SD above the mean. The use of mean and SD is questionable, so better use median and IQR. If we use the 'outlier' rule to find unusual class sizes, IQR = 11, 1.5*IQR = 16.5, Q1-1.5*IQR = 12.5, thus class sizes of 20 are not exceptional by this standard.
c. Median budget = $12 + $0.75(33) = $36.75
Q1 budget = $12 + $0.75(29) = $33.75
Q3 budget = $12 + $0.75(40) = $42.00
IQR = $42.00 - $33.75 = $8.25
d. Mean budget = $12 + $0.75(33.39) = $37.04
Standard deviation = $0.75(5.66) = $4.25

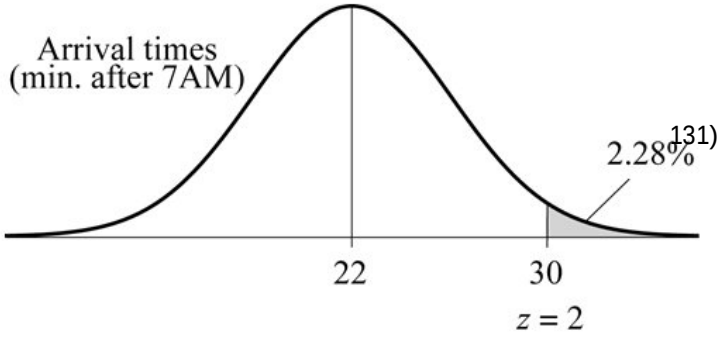
127)



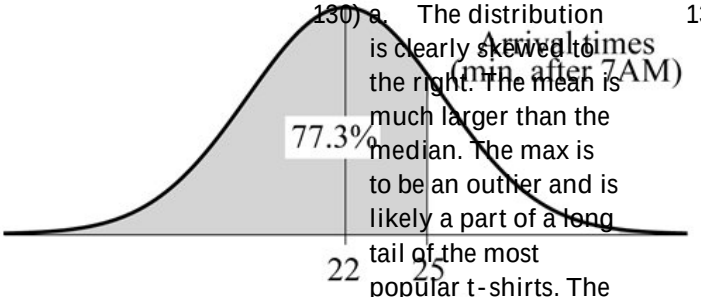
128) The standard light bulb lasted more than 1.5 standard deviations above the mean life, compared to the soft light bulb at 1.4286 standard deviations above its mean. The standard light bulb's performance was slightly better.

Standard light bulb: z = (750 - 675)/50 = 1.5
Soft light bulb: $z = \frac{750 - 700}{35} = 1.4286$

129) a. Employees are late if they arrive after 7:30 AM.
P(time>30) = P(z>2) ≅ 0.02275
According to the Normal model, about 2.28% of employees are expected to arrive after 7:30 AM.



b. P(time<25) = P(z<0.75) ≅ 0.07734
According to the Normal model, about 77.34% of employees arrive at work before 7:25 AM.



c. Virtually all times lie within 3 standard deviations of the mean. (Accept other reasonable z-scores greater than 3). If z*s = 8 min with z = 3, then 3s = 8 min, so s = 2.667 minutes.
d. A smaller standard deviation would mean greater consistency in arrival times.

130) a. The distribution is clearly skewed to the right. The mean is much larger than the median. The max is to be an outlier and is likely a part of a long tail of the most popular t-shirts. The min and Q1 are very close together, while the spread increases between the median, Q3, and the max.

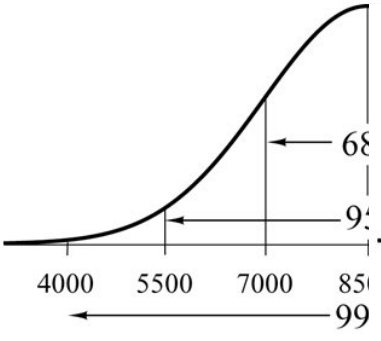
b. mean = 23*$2 = $46; sd = 7.84*$2 = $15.68

c. median = 3.5*15 - 35 = $17.50; IQR = 3.5*(21-3) = $63

d. mean = 3.5*23 - 35 = $45.50; sd = 3.5*7.84 = $27.44

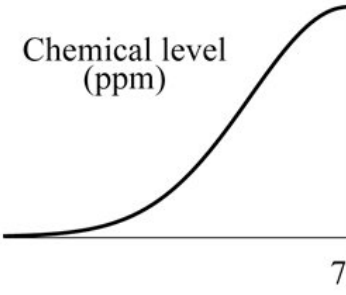
e. The distribution is strongly right skewed, thus mean and standard deviation are not appropriate.

131)

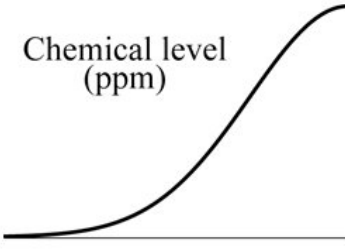


132) The Jersey's milk production was comparatively higher. That cow gave slightly more than 2 standard deviations above the average amount of milk ($z = 2.2$), while the Guernsey gave less than 2 standard deviations more than the average for Guernseys ($z = 1.875$).

133) a. According to the normal model, we expect about 11.7% of the batches to exceed the 80 ppm standard.



b. According to the Normal model, a mean of about 71.37ppm would need to be achieved.

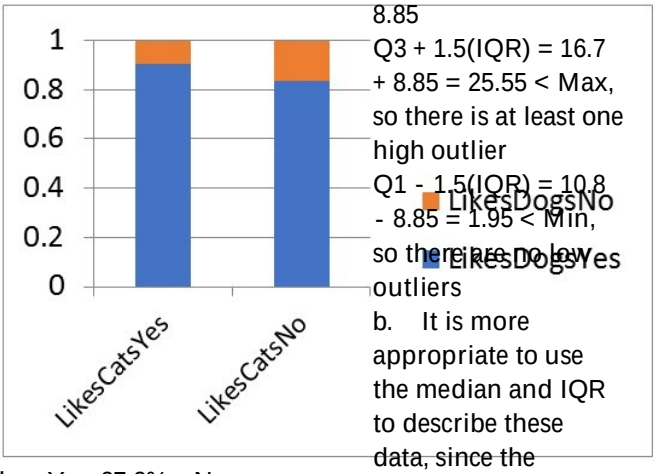


c. According to the Normal model, the new standard deviation would need to be at most 2.43ppm.

d. The scrubber must be more consistent in its performance from batch to batch.

134) D
135) D
136) C
137) B
138) D
139) C
140) E
141) A
142) E
143) B
144) C
145) D
146) B
147) E
148) D
149) C
150) E
151) D
152) E
153) D
154) D
155) C
156) B
157) B
158) D
159) B
160) D
161) C
162) D
163) D

164) a. One possible option →



b. Yes: 87.8% No: 12.2%

c. Yes: 90.2% No: 9.8%

d. segmented bar graph, side-by-side bar graph, or pie charts

e. Perhaps. There is little difference between the percents of those who like dogs, depending on whether they like cats. Of those who like cats, 90.2% like dogs, compared to 87.8% overall.

165) a.

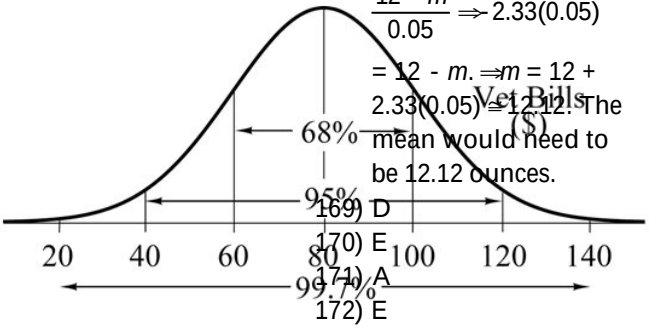
Statistic	Hours of
Mean	4.5
Median	3.5
SD	1.2
IQR	2.0
Minimum	0.5

b. -1.50

166) a. IQR = Q3 - Q1 = 16.7 - 10.8 = 5.9
1.5(IQR) = 1.5(5.9) = 8.85
Q3 + 1.5(IQR) = 16.7 + 8.85 = 25.55 < Max, so there is at least one high outlier
Q1 - 1.5(IQR) = 10.8 - 8.85 = 1.95 < Min, so there are no low outliers

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

167) a.



b. $z = \frac{125 - 80}{20} =$ 2.25, more than 2 standard deviations above the mean bill. A veterinary bill of $125 is unusual.

c. Q1 has $z = -0.67$ and Q3 has $z = +0.67$, so $-0.67 = \frac{y - 80}{20}$, thus $y = 80 - 0.67(20) = 66.67$ and $0.67 = \frac{y - 80}{20}$, thus $y = 80 + 0.67(20) = 93.33$. The IQR = Q3 - Q1 = 93.33 - 66.67 = $26.66.

168) a. $z = \frac{12 - 12.1}{0.05} =$ -2.0, which suggests that 2.28% of cans are under-filled.

b. A z-score of -2.33 has 1% to its left, meaning that 1% of the cans would be under-filled.

i. $-2.33 = \frac{12 - 12.1}{s} \Rightarrow 2.33s = -0.1. \Rightarrow s = -0.1/-2.33 \cong 0.043$. The standard deviation would need to be 0.043 ounces.

ii. $-2.33 = \frac{12 - m}{0.05} \Rightarrow 2.33(0.05) = 12 - m. \Rightarrow m = 12 + 2.33(0.05) \cong 12.12$. The mean would need to be 12.12 ounces.

169) D
170) E
171) A
172) E
173) A
174) B
175) D
176) A
177) D
178) A

179) a. Car: 19.5% Bus: 30% Train: 50.5%
b. Car: 28.9% Bus: 22.2% Train: 48.9%
c. segmented bar graph, or pie charts
d. No, there is a difference between the percents in two types of transportation - Car and Bus categories, depending on the Job Classification.

	Car	Bus	Train
Management	28.9%	22.2%	48.9%
Labor	17.0%	32.1%	50.9%

Although about half of each group take the train, management are more likely than labor to come by car and less likely to take a bus.

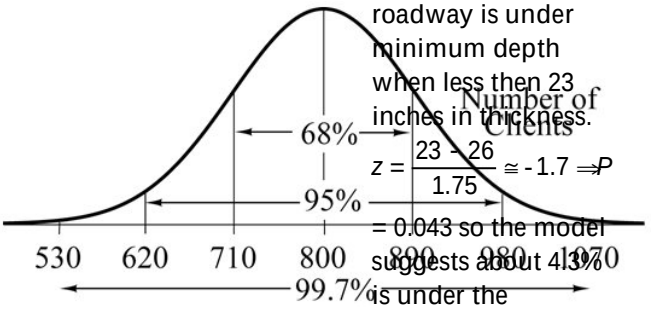
180) a.

Statistic
Mean
Standard deviation
IQR
Maximum

b. +1.80

181) a. IQR = $Q_3 - Q_1$ = 110 - 30 = 80
1.5(IQR) = 1.5(80) = 120
Q_3 + 1.5(IQR) = 110 + 120 = 230; Max (200) < Q_3 + 1.5(IQR), so no high outliers.
Q_1 - 1.5(IQR) = 30 - 120 = -90; Min (15) > Q_1 - 1.5(IQR), so no low outliers.
b. 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.)

182) a.



b. $Q_1 \Rightarrow P = 0.25$ and $z = -0.674$,

$$-0.674 = \frac{x - 800}{90}$$

$-60.66 = x - 800$
$x = 739.34$
So the first quartile is at 740 clients.
c. 450 (5th percentile) has $z = -1.645$
1085 (60th percentile) has $z = +0.253$

$$\frac{450 - \mu}{\sigma} = -1.645 \text{ and } \frac{1084 - \mu}{\sigma} = 0.253 \Rightarrow$$

$450 - \mu = -1.645\sigma$ and $1084 - \mu = 0.253\sigma \Rightarrow$
$1.898\sigma = 634 \Rightarrow \sigma \cong 334.0$ and $\mu \cong 999.5$
$N(999.5, 334.0)$

183) a. The concrete roadway is under minimum depth when less then 23 inches in thickness.

$$z = \frac{23 - 26}{1.75} \cong -1.7 \Rightarrow P = 0.043$$

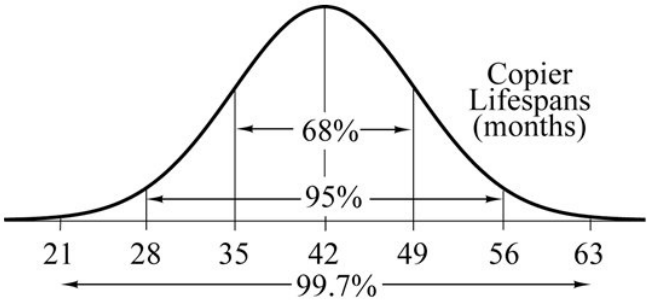
so the model suggests about 4.3% is under the minimum depth
b. $P = 0.03 \Rightarrow z = -1.88$, so $-1.88 = \frac{23 - 26}{\sigma}$; then $\sigma \cong 1.596$ inches
c. A smaller standard deviation means that the thickness of the concrete will be more consistent.

184) A
185) C
186) E
187) C
188) D
189) A
190) B
191) A
192) A
193) E
194) a. 45%
b. 30% cash, 20% check, 50% charge
c. segmented bar graphs, side-by-side bar graphs, or pie charts
d. Yes. Women are more likely to charge their purchases than men (50% to 30%) and less likely to pay cash (30% to 45%).

195) a. 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.
b. No. $90 is higher than over 25% of the bills, so it is not unusually low.

196) a. 3400 yuans, 2000, 6200, 2400 b. $z = +1.20$

197) a.



b. 28, 56. The claim is probably false. This model should provide a useful estimate of what might happen, but is not certain to predict what actually will happen.
c. 46.7 months
d. 19.6%
e. 4.7 months (should all include sketches of labeled curves)
f. A smaller standard deviation means that the copiers would be more consistent in their lifespans
g. 36 months (10th percentile) has z = -1.28 and 42 months (35th percentile) has z = -0.385.

$\frac{36 - \mu}{\sigma} = -1.28155$

and $\frac{42 - \mu}{\sigma} =$

$-0.38532 \Rightarrow 36 - \mu = -1.28155\sigma$ and $42 - \mu = -0.38532\sigma \Rightarrow 0.89623\sigma = 6 \Rightarrow \sigma \cong 6.695$ and $\mu \cong 44.580 \Rightarrow N(44.580, 6.695)$