Solve the problem.
1) The average age of the students in a statistics class is 22 years. Does this statement describe descriptive or inferential statistics?
   A) Inferential statistics   B) Descriptive statistics

2) From past figures, it is predicted that 30% of the registered voters will vote in the March primary. Does this statement describe descriptive or inferential statistics?
   A) Descriptive statistics   B) Inferential statistics

Answer the question True or False.
3) The process of using information from a sample to make generalizations about the larger population is called statistical inference.
   A) True   B) False

Solve the problem.
4) Which of the following is not an element of descriptive statistical problems?
   A) information revealed in a data set is summarized
   B) predictions are made about a larger set of data
   C) data are displayed visually in graphs
   D) patterns in a data set are identified

5) An assembly line is operating satisfactorily if fewer than 4% of the phones produced per day are defective. To check the quality of a day's production, the company randomly samples 10 phones from a day's production to test for defects. Define the population of interest to the manufacturer.
   A) the 10 phones sampled and tested
   B) all the phones produced during the day in question
   C) the 4% of the phones that are defective
   D) the 10 responses: defective or not defective

6) An insurance company conducted a study to determine the percentage of cardiologists who had been sued for malpractice in the previous three years. The sample was randomly chosen from a national directory of doctors. What is the variable of interest in this study?
   A) the doctor's area of expertise (i.e., cardiology, pediatrics, etc.)
   B) the responses: have been sued/have not been sued for malpractice in the last three years
   C) all cardiologists in the directory
   D) the number of doctors who are cardiologists

7) A postal worker counts the number of complaint letters received by the United States Postal Service in a given day. Identify the type of data collected.
   A) qualitative   B) quantitative

8) An usher records the number of unoccupied seats in a movie theater during each viewing of a film. Identify the type of data collected.
   A) qualitative   B) quantitative

9) A fan observes the numbers on the shirts of a girl's soccer team. Identify the type of data collected.
   A) qualitative   B) quantitative

10) What number is missing from the table?

Year in College	Frequency	Relative Frequency
Freshman	600	.30
Sophomore	560	.28
Junior		.22
Senior	400	.20
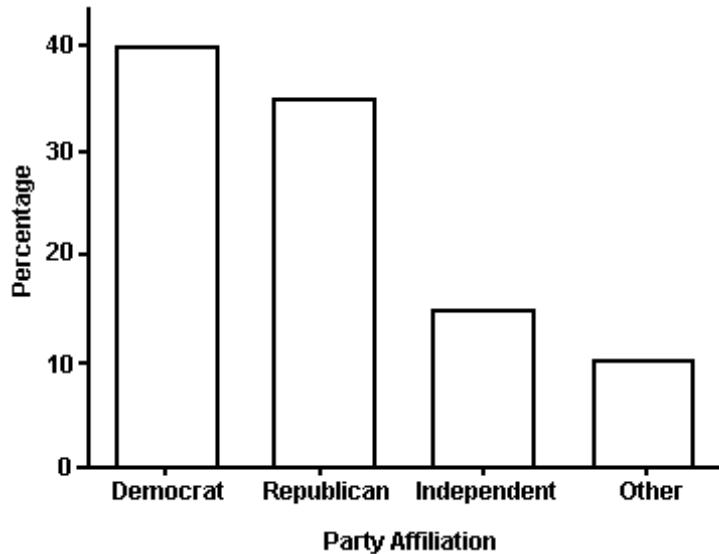
A) 520 B) 440 C) 220 D) 480

11)

The bar graph shows the political affiliation of 1,000 registered U.S. voters. What percentage of the voters belonged to one of the traditional two parties (Democratic or Republican)?
A) 75% B) 40% C) 25% D) 35%

Answer the question True or False.

12) If 25% of your statistics class is sophomores, then in a pie chart representing classifications of the students in your statistics class the slice assigned to sophomores is 90°.
A) True B) False

13) The slices of a pie chart must be arranged from largest to smallest in a clockwise direction.
A) True B) False

14) The bars in a histogram should be arranged by height in descending order from left to right.
A) True B) False

15) A histogram can be constructed using either class frequencies or class relative frequencies as the heights of the bars.
A) True B) False

Solve the problem.

16) A survey was conducted to determine how people feel about the quality of programming available on television. Respondents were asked to rate the overall quality from 0 (no quality at all) to 100 (extremely good quality). The stem-and-leaf display of the data is shown below.

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

What percentage of the respondents rated overall television quality as very good (regarded as ratings of 80 and above)?

A) 4% B) 6% C) 1% D) 24%

17) Parking at a university has become a problem. University administrators are interested in determining the average time it takes a student to find a parking spot. An administrator inconspicuously followed 170 students and recorded how long it took each of them to find a parking spot. Which of the following types of graphs should not be used to display information concerning the students parking times?

A) pie chart B) box plot
C) stem-and-leaf display D) histogram
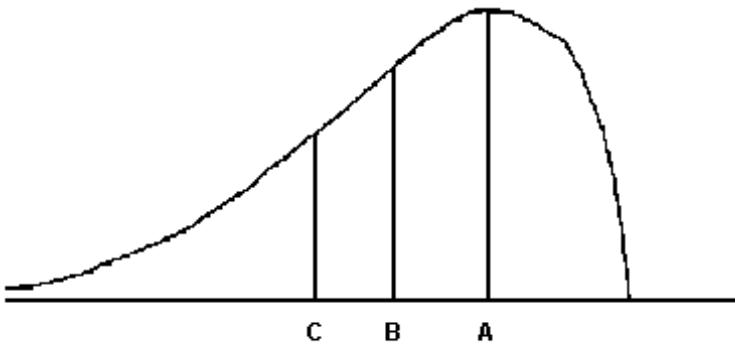
18) Fill in the blank. One advantage of the _____ is that the actual data values are retained in the graphical summarization of the data.

A) histogram B) pie chart C) stem-and-leaf plot

19) A data set contains the observations 7, 4, 2, 3, 1. Find $\left(\sum x\right)^2$.

A) 289 B) 17 C) 34 D) 79

20)

For the distribution drawn here, identify the mean, median, and mode.

A) A = mode, B = mean, C = median B) A = mean, B = mode, C = median
C) A = mode, B = median, C = mean D) A = median, B = mode, C = mean

21) Which of the following is *not* a measure of central tendency?
    A) median   B) mode   C) range   D) mean

22) The output below displays the mean and median for the state high school dropout rates in 1998 and 2002.

	Drop 1998	Drop 2002
N	51	51
MEAN	28.15	26.75
MEDIAN	27.43	25.65

Use the information to determine the shape of the distributions of the high school dropout rates in 1998 and 2002.
    A) Both the 1998 and 2002 high school dropout rates have distributions that are skewed to the right.
    B) The 1998 high school dropout rate has distribution skewed to the left and and 2002 has distribution skewed to the right.
    C) The 1998 high school dropout rate has distribution skewed to the right and and 2002 has distribution skewed to the left.
    D) Both the 1998 and 2002 high school dropout rates have distributions that are skewed to the right.
    E) Neither of the answers above is correct

23) The calculator screens summarize a data set.

```
1-Var Stats
x̄=79.95238095
Σx=1679
Σx²=138471
Sx=14.54467666
σx=14.19415101
↓n=21
```

```
1-Var Stats
↑n=21
 minX=30
 Q₁=75
 Med=82
 Q₃=90
 maxX=97
■
```

    a. How many data items are in the set?
    b. What is the sample standard deviation?
    c. Identify the mean, median, and mode, if possible.
    d. Are there any outlires? Explain.
    e. Is the distribution of the data symetric and skewed? If skewed, which way? Explain.

24) The top speeds for a sample of five new automobiles are listed below. Calculate the standard deviation of the speeds. <u>NOTE</u>: on the test you might be asked to compute by hand, showing steps and using formula.

180, 175, 200, 100, 170
    A) 149.82   B) 188.2551   C) 38.0789   D) 263.6522

Answer the question True or False.
    25) The mean and the median are useful measures of central tendency for both qualitative and quantitative data.
        A) True   B) False

Solve the problem.

26) A standardized test has a mean score of 500 points with a standard deviation of 100 points. Five students' scores are shown below.

   Adam: 575   Beth: 690   Carlos: 750   Doug: 280   Ella: 440

   Which of the students have scores within two standard deviations of the mean?
   A) Carlos, Doug   B) Adam, Beth, Ella
   C) Adam, Beth   D) Adam, Beth, Carlos, Ella

27) The amount of television viewed by today's youth is of primary concern to Parents Against Watching Television (PAWT). 300 parents of elementary school-aged children were asked to estimate the number of hours per week that their child watches television. The mean and the standard deviation for their responses were 12 and 2, respectively. PAWT constructed a stem-and-leaf display for the data that showed that the distribution of times was a symmetric, mound-shaped distribution. Give an interval where you believe approximately 95% of the television viewing times fell in the distribution.
   A) less than 10 and more than 14 hours per week   B) between 6 and 18 hours per week
   C) between 8 and 16 hours per week   D) less than 16

28) A recent survey was conducted to compare the cost of solar energy to the cost of gas or electric energy. Results of the survey revealed that the distribution of the amount of the monthly utility bill of a 3-bedroom house using gas or electric energy had a mean of $150 and a standard deviation of $8. If the distribution can be considered mound-shaped and symmetric, what percentage of homes will have a monthly utility bill of more than $142?
   A) approximately 16%   B) approximately 84%
   C) approximately 34%   D) approximately 95%

29) A study was designed to investigate the effects of two variables — (1) a student's level of mathematical anxiety and (2) teaching method — on a student's achievement in a mathematics course. Students who had a low level of mathematical anxiety were taught using the traditional expository method. These students obtained a mean score of 430 with a standard deviation of 20 on a standardized test. Assuming no information concerning the shape of the distribution is known, what percentage of the students scored between 390 and 470?
   A) approximately 95%   B) at least 89%
   C) at least 75%   D) approximately 68%

30) A radio station claims that the amount of advertising each hour has a mean of 17 minutes and a standard deviation of 1.7 minutes. You listen to the radio station for 1 hour and observe that the amount of advertising time is 7 minutes. Calculate the z-score for this amount of advertising time.
   A) $z = -17$ B) $z = 0.31$ C) $z = 5.88$ D) $z = -5.88$

31) Test scores for a history class had a mean of 79 with a standard deviation of 4.5. Test scores for a physics class had a mean of 69 with a standard deviation of 3.7. One student earned a 57 on the history test and a 60 on the physics test. Calculate the z-score for each test. On which test did the student perform better?

32) Summary information is given for the weights (in pounds) of 1000 randomly sampled tractor trailers.

MIN:	4005	25%:	5605
MAX:	10,605	75%:	8605
AVE:	7005	Std. Dev.:	1400

   Find the percentage of tractor trailers with weights between 5605 and 8605 pounds.
   A) 50%   B) 100%   C) 25%   D) 75%

33) The speeds of the fastballs thrown by major league baseball pitchers were measured by radar gun. The mean speed was 83 miles per hour. The standard deviation of the speeds was 5 mph. Which of the following speeds would be classified as an outlier?

    A) 73 mph   B) 91 mph   C) 78 mph   D) 99 mph

34) Which of the following statements could be an explanation for the presence of an outlier in the data?

    A) The measurement may be correct and from the same population as the rest but represents a rare event. Generally, we accept this explanation only after carefully ruling out all others.

    B) The measurement belongs to a population different from that from which the rest of the sample was drawn.

    C) The measurement is incorrect. It may have been observed, recorded, or entered into the computer incorrectly.

    D) All of the above are explanations for outliers.

35) At the U.S. Open Tennis Championship a statistician keeps track of every serve that a player hits during the tournament. The lower quartile of a particular player's serve speeds was reported to be 88 mph. Which of the following interpretations of this information is correct?

    A) 25% of the player's serves were hit at 88 mph.

    B) 88 serves traveled faster than the lower quartile.

    C) 75% of the player's serves were hit at speeds less than 88 mph.

    D) 75% of the player's serves were hit at speeds greater than 88 mph.
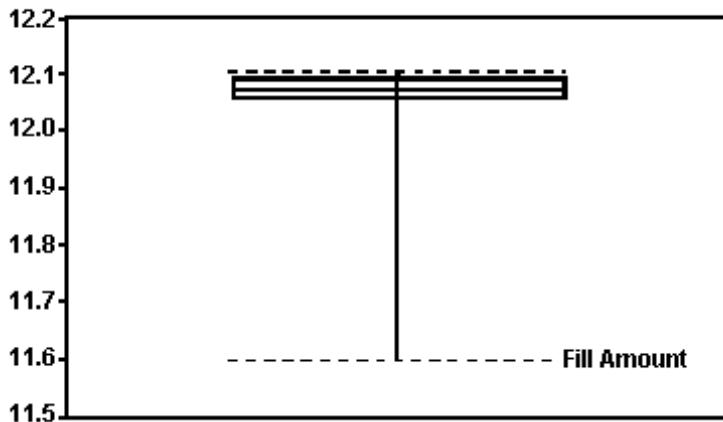
36) The calculator screens summarize a data set.

```
1-Var Stats          1-Var Stats
x̄=79.95238095        ↑n=21
Σx=1679               minX=30
Σx²=138471            Q₁=75
Sx=14.54467666        Med=82
σx=14.19415101        Q₃=90
↓n=21                 maxX=97
                      ■
```

    a. Identify the lower and upper quartiles of the data set.

    b. Find the interquartile range.

    c. Is there reason to suspect that the data may contain an outlier? Explain.

37) The box plot shown below displays the amount of soda that was poured by a filling machine into 12-ounce soda cans at a local bottling company.

Based on the box plot, what shape do you believe the distribution of the data to have?
A) skewed to the center
B) approximately symmetric
C) skewed to the left
D) skewed to the right

38) If sample points A, B, C, and D are the only possible outcomes of an experiment, find the probability of D using the table below.

Sample Point	A	B	C	D
Probability	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	

A) $\frac{1}{8}$
B) $\frac{1}{4}$
C) $\frac{5}{8}$
D) $\frac{3}{8}$

39) A bag of candy was opened and the number of pieces was counted. The results are shown in the table below:

Color	Number
Red	25
Brown	20
Green	20
Blue	15
Yellow	10
Orange	10

List the sample space for this problem.
A) {Red, Brown, Green, Blue, Yellow, Orange}
B) {Red}
C) {25, 20, 20, 15, 10, 10}
D) {0.25, 0.20, 0.20, 0.15, 0.10, 0.10}

40) The outcome of an experiment is the number of resulting heads when a nickel and a dime are flipped simultaneously. What is the sample space for this experiment?
A) {HH, HT, TH, TT}
B) {nickel, dime}
C) {HH, HT, TT}
D) {0, 1, 2}

41) An experiment consists of rolling two dice and summing the resulting values. Which of the following is not a sample point for this experiment?

    A) 1   B) 7   C) 6   D) 2

42) A hospital reports that two patients have been admitted who have contracted Crohn's disease. Suppose our experiment consists of observing whether each patient survives or dies as a result of the disease. The simple events and probabilities of their occurrences are shown in the table (where S in the first position means that patient 1 survives, D in the first position means that patient 1 dies, etc.).

Simple Events	Probabilities
SS	0.52
SD	0.19
DS	0.16
DD	0.13

Find the probability that both patients survive.

    A) 0.2704   B) 0.52   C) 0.13   D) 0.35

43) A hospital reports that two patients have been admitted who have contracted Crohn's disease. Suppose our experiment consists of observing whether each patient survives or dies as a result of the disease. The simple events and probabilities of their occurrences are shown in the table (where S in the first position means that patient 1 survives, D in the first position means that patient 1 dies, etc.).

Simple Events	Probabilities
SS	0.56
SD	0.20
DS	0.19
DD	0.05

Find the probability that at least one of the patients does not survive.

    A) 0.05   B) 0.20   C) 0.39   D) 0.44

44) The table displays the probabilities for each of the outcomes when three fair coins are tossed and the number of heads is counted. Find the probability that the number of heads on a single toss of the three coins is at most 2.

Outcome	0	1	2	3
Probability	.125	.375	.375	.125

    A) .125   B) .750   C) .875   D) .500

45) Two chips are drawn at random and without replacement from a bag containing four blue chips and three red chips. Find the probability of drawing two red chips.

    A) $\dfrac{1}{12}$ B) $\dfrac{1}{7}$ C) $\dfrac{9}{49}$ D) $\dfrac{6}{7}$

46) The data below show the types of medals won by athletes representing the United States in the Winter Olympics. Suppose that one medal is chosen at random and the type of medal noted.

gold	gold	silver	gold	bronze	silver	silver
bronze	gold	silver	silver	bronze	silver	gold
gold	silver	silver	bronze	bronze	gold	silver
gold	gold	bronze	bronze			

   a. List the sample points for this experiment.
   b. Find the probability of each sample point.
   c. What is the probability that the medal was not bronze?

47) A pair of fair dice is tossed. Events A and B are defined as follows.

   A: {The sum of the numbers on the dice is 3}
   B: {At least one of the dice shows a 2}

   Identify the sample points in the event A ∩ B.
   A) {(1, 2), (2, 1)}
   B) {(2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6)}
   C) {(1, 2), (2, 1), (2, 2), (2, 3), (2, 4), (2, 5), (2, 6), (3, 2), (4, 2), (5, 2), (6, 2)}
   D) {(2, 2), (2, 3), (2, 4), (2, 5), (2, 6), (3, 2), (4, 2), (5, 2), (6, 2)}

48) Four hundred accidents that occurred on a Saturday night were analyzed. The number of vehicles involved and whether alcohol played a role in the accident were recorded. The results are shown below:

Number of Vehicles Involved

Did Alcohol Play a Role?	1	2	3 or more	Totals
Yes	59	99	12	170
No	22	177	31	230
Totals	81	276	43	400

   Suppose that one of the 400 accidents is chosen at random. What is the probability that the accident involved more than a single vehicle?

   A) $\dfrac{43}{400}$ B) $\dfrac{81}{400}$ C) $\dfrac{319}{400}$ D) $\dfrac{3}{100}$

49) A local country club has a membership of 600 and operates facilities that include an 18-hole championship golf course and 12 tennis courts. Before deciding whether to accept new members, the club president would like to know how many members regularly use each facility. A survey of the membership indicates that 60% regularly use the golf course, 44% regularly use the tennis courts, and 8% use both of these facilities regularly. Find the probability that a randomly selected member uses the golf or tennis facilities regularly.

   NOTE: DRAW a complete VENN DIAGRAM for this problem

50) Suppose that 62% of the employees at a company are male and that 35% of the employees just received merit raises. If 20% of the employees are male and received a merit raise, what is the probability that a randomly chosen employee is male or received a merit raise?

51) A pair of fair dice is tossed. Events *A* and *B* are defined as follows.

A: {The sum of the numbers on the dice is 6}
B: {At least one of the numbers 3}

   a. Identify the sample points in the event $A \cup B$.
   b. Identify the sample points in the event $A \cap B$.
   c. Find $P(A \cup B)$.
   d. Find $P(A \cap B)$.

52) A state energy agency mailed questionnaires on energy conservation to 1,000 homeowners in the state capital. Five hundred questionnaires were returned. Suppose an experiment consists of randomly selecting one of the returned questionnaires. Consider the events:

A: {The home is constructed of brick}
B: {The home is more than 30 years old}
D: {The home is heated with oil}

Which of the following describes the event $B \cup D^C$?
   A) homes more than 30 years old that are heated with oil
   B) homes that are not older than 30 years old and heated with oil
   C) homes more than 30 years old or homes that are not heated with oil
   D) homes more than 30 years old that are not heated with oil

53) An insurance company looks at many factors when determining how much insurance will cost for a home. Two of the factors are listed below:

A: {The home's roof is less than 10 years old}
B: {The home has a security system}

In the words of the problem, define the event B^C.
   A) The home has a security system
   B) The home does not have a security system
   C) The home is less than 10 years old
   D) The home is not less than 10 years old

54) If $P(A \cup B) = 1$ and $P(A \cap B) = 0$, then which statement is true?
   A) *A* and *B* are supplementary events.
   B) *A* and *B* are reciprocal events.
   C) *A* and *B* are both empty events.
   D) *A* and *B* are complementary events.

55) In a class of 40 students, 22 are women, 10 are earning an A, and 7 are women that are earning an A. If a student is randomly selected from the class, find the probability that the student is a woman given that the student is earning an A.

   A) $\dfrac{7}{22}$
   B) $\dfrac{11}{20}$
   C) $\dfrac{7}{10}$
   D) $\dfrac{5}{11}$

56) Suppose a basketball player is an excellent free throw shooter and makes 91% of his free throws (i.e., he has a 91% chance of making a single free throw). Assume that free throw shots are independent of one another. Find the probability that the player misses four consecutive free throws.
   A) 0.6857
   B) 0.0001
   C) 0.9999
   D) 0.3143

57) Classify the events as dependent or independent: Events *A* and *B* where $P(A)$ = 0.3, $P(B)$ = 0.4, and $P(A$ and $B)$ = 0.12.
   A) dependent   B) independent

58) Classify the events as dependent or independent: Events *A* and *B* where $P(A)$ = 0.6, $P(B)$ = 0.9, and $P(A$ and $B)$ = 0.53.
   A) dependent   B) independent

59) At a certain university, 70% of the students own cars. However, only 45% of the residence hall students own cars. Are the events owning a car and living in a residence hall independent? Explain.

60) In a particular town, 20% of the homes have monitored security systems. If an alarm is triggered, the security system company will contact the local police to alert them of the alarm. Of all the alarm calls that the local police receive, they only have the manpower to answer 30% of the calls. Suppose we randomly sample one home that was broken into over the last month from this town. What is the probability that this home has a monitored security system and that the police answered the alarm call?
   A) 0.2000   B) 0.0600   C) 0.3000   D) 0.9400

1) B
2) B
3) A
4) B
5) B
6) B
7) B
8) B
9) A
10) B
11) A
12) A
13) B
14) B
15) A
16) A
17) A
18) C
19) A
20) C
21) C
22) A
23) a. n = 21

b. $\sum x = 1679$

c. mean: $\bar{x} \approx 79.95$; median: Med=82; mode: not possible
24) C
25) B
26) B
27) C
28) B
29) C
30) D
31) history z-score = -4.89; physics z-score = -2.43; The student performed better on the physics test.
32) A
33) D
34) D
35) D
36) a. lower quartile: Q1=75; upper quartile: Q3=90

b. interquartile range: 90 - 75 = 15

c. Yes; the smallest measurement, 30, is three times the interquartile range less than the lower quartile, so it is a suspected outlier.
37) C
38) C
39) A
40) D
41) A
42) B
43) D
44) C

45) B
46) a.   {gold, silver, bronze}

   b. $P(\text{gold}) = \dfrac{9}{25} = .36$, $P(\text{silver}) = \dfrac{9}{25} = .36$, $P(\text{bronze}) = \dfrac{4}{25} = .28$

   c. $P(\text{gold}) + P(\text{silver}) = \dfrac{9}{25} + \dfrac{9}{25} = \dfrac{18}{25} = .72$

47) A
48) C
49) $P(\text{uses golf or tennis regularly})$
   $= P(\text{golf}) + P(\text{tennis}) - P(\text{both tennis and golf})$
   $= .60 + .44 - .8 = .96$
50) Using the Additive Rule, the probability is .62 + .35 - .20 = .77.
51) a.   {(1, 3), (1, 5), (2, 3), (2, 4), (3, 1), (3, 2), (3, 3), (3, 4), (3, 5) (3, 6)
         (4, 2), (4, 3), (5, 1), (5, 3), (6, 3)}
   b.   {(3, 3)}

   c. $P(A \cup B) = \dfrac{15}{36} = \dfrac{5}{12}$

   d. $P(A \cap B) = \dfrac{1}{36}$

52) C
53) B
54) D
55) C
56) B
57) B
58) A
59) No; $P(\text{owning car}) = .7$ and $P(\text{owning car} \mid \text{residence hall}) = .45$; Since these probabilities are not equal, the events are
   not independent.
60) B

13