TEST BANK

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Victor Valley College

INTRODUCTORY STATISTICS

TENTH EDITION

AND

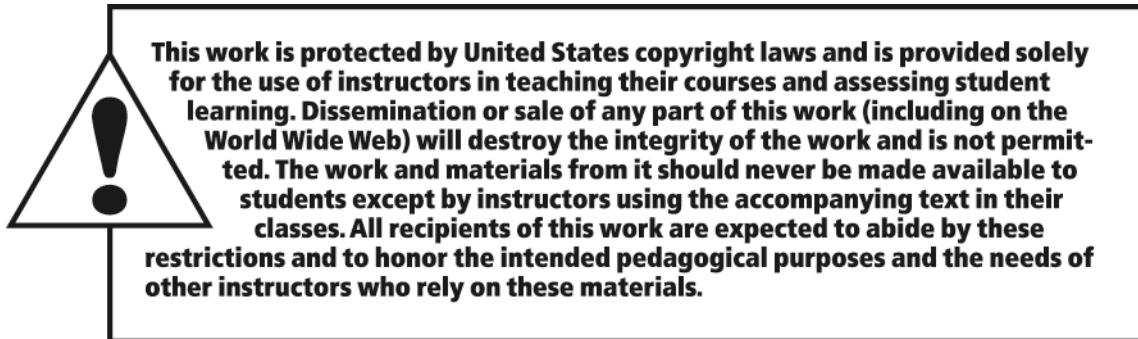# ELEMENTARY STATISTICS

NINTH EDITION

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Statistical Sciences
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Introductory Statistics

Elementary Statistics

Introductory Statistics (IS) / Elementary Statistics (ES): Chapter 1 Test: Form A

Name_____

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

Provide an appropriate response.
    1) The table below shows the average income by age group for the residents
       of one town in the year 1998. The average incomes for each age group are
       estimates based on a sample of size 100 from each group.

Age group	Average income
18–24	$17,180
25–39	$26,661
40–54	$32,471
55–70	$25,960
Over 70	$18,241

       Classify the study as either descriptive or inferential.
       A) Descriptive   B) Inferential

1) _____

Answer the question.
    2) An employee at the local ice cream parlor asks three customers if they like
       chocolate ice cream. Identify the sample and population.
       A) Sample: all customers; population: the 3 selected customers
       B) Sample: the 3 selected customers; population: the customers who
          like chocolate ice cream
       C) Sample: the 3 selected customers; population: all customers
       D) Sample: the customers who like chocolate ice cream; population: all
          customers

2) _____

Identify the study as an observational study or a designed experiment.
    3) In a clinical trial, 780 participants suffering from high blood pressure were
       randomly assigned to one of three groups. Over a one–month period, the
       first group received the experimental drug, the second group received a
       placebo, and the third group received no treatment. The diastolic blood
       pressure of each participant was measured at the beginning and at the end
       of the period and the change in blood pressure was recorded. The average
       change in blood pressure was calculated for each of the three groups and
       the three averages were compared.
       A) Designed experiment   B) Observational study

3) _____

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

Provide an appropriate response.

4) At one hospital in 1992, 674 women were diagnosed with breast   4) _____
   cancer. Five years later, 88% of the Caucasian women and 63% of
   the African American women were still alive. This observational
   study shows an association between race and breast cancer
   survival--that Caucasian women are more likely to survive breast
   cancer than African American women. How could this study be
   modified to make it a designed experiment? Comment on the
   feasibility of the designed experiment that you described.

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

List all possible samples from the specified population.

5) The finalists in an essay competition are Lisa (L), Melina (M), Ben (B),   5) _____
   Danny (D), Eric (E), and Joan (J). Consider these finalists to be a
   population of interest. List the 20 possible samples (without replacement)
   of size three from this population of six finalists.

   A) L,M,B L,M,D L,M,E L,M,J L,B,D L,B,E L,B,J L,D,E L,D,J
      L,E,J
      M,B,D M,B,E M,B,J M,D,E M,D,J M,E,J M,L,B M,L,D M,L,J
      B,D,E
   B) L,M,B L,M,D L,M,E L,M,J L,B,D L,B,E L,B,J L,D,E L,D,J
      L,E,J
      M,B,D M,B,E M,B,J M,D,E M,D,J M,E,J B,D,E B,D,J B,E,J
      D,E,J
   C) L,M,B L,M,D L,M,E L,M,J L,B,D L,B,E L,B,J L,D,E L,D,J
      L,E,J
      L,L,M L,L,B L,L,D L,L,E L,L,J M,M,B M,M,D M,M,E M,M,J
      B,B,D
   D) L,M,B L,M,D L,M,E L,M,J L,B,D L,B,E L,B,J L,D,E L,D,J
      L,L,M
      M,B,D M,B,E M,B,J M,D,E M,D,J M,M,J B,D,E B,B,J B,E,J
      D,D,J

Provide an appropriate response.

6) The finalists in an essay competition are Lisa (L), Melina (M), Ben (B), Danny (D), Eric (E), and Joan (J). Consider these finalists to be a population of interest. The possible samples (without replacement) of size three that can be obtained from this population of six finalists are as follows.

6) _____

    L,M,B L,M,D L,M,E L,M,J L,B,D L,B,E
    L,B,J L,D,E L,D,J L,E,J M,B,D M,B,E
    M,B,J M,D,E M,D,J M,E,J B,D,E B,D,J
    B,E,J D,E,J

If a simple random sampling method is used to obtain a sample of three of the finalists, what are the chances of selecting Ben, Danny, and Joan?

A) $\dfrac{1}{20}$ B) $\dfrac{1}{2}$ C) $\dfrac{3}{20}$ D) $\dfrac{1}{3}$

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

Use the random number table in Appendix A to obtain the required list of random numbers.

7) A company employs 5382 people and wishes to interview a random sample of 14 of them with regard to the company's health insurance policy. Construct a list of 14 random numbers between 1 and 5382 that can be used in obtaining the required simple random sample. Use the random number table and use as your starting point the digits 0691 in row 3, columns 30–33.

7) _____

Provide an appropriate response.

8) A college lecturer has devised a new method of teaching a particular mathematical concept and wishes to try out this teaching method on a representative sample of his students. There are 76 students in his class and he wishes to obtain a simple random sample of 25 of them. Describe a method which would be unlikely to yield a representative sample.

8) _____

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

9) At a college there are 120 freshmen, 90 sophomores, 110 juniors, and 80 seniors. A school administrator selects a simple random sample of 12 of the freshmen, a simple random sample of 9 of the sophomores, a simple random sample of 11 of the juniors, and a simple random sample of 8 of the seniors. She then interviews all the students selected. Identify the type of sampling used in this example.

9) _____

    A) Systematic random sampling
    B) Stratified sampling
    C) Cluster sampling
    D) Simple random sampling

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

10) The effects of global warming on the planet have received increased national attention in recent years. But how many U.S. adults would be willing to change certain personal behaviors in order to help reverse the effects of global warming? A major pollster conducted a telephone poll of 1010 U.S. adults to determine the answer to the following questions: (1) Is public transportation a viable option for you? (2) If not, do you own a hybrid vehicle or one that gets more than an overall average of 30 miles per gallon? (3) If not, would you be willing to purchase a hybrid vehicle within the five years? Respondents were also asked questions about age, sex, race, education, region, and household income to ensure that results represented a cross section of U.S. adults.

10) _____

i) What kind of sampling design was used in this survey? Explain your answer.
ii) If 89% of the respondents answered the first question in the negative, what was the approximate sample size for the second question?
iii) If 75% of those responding to the second question answered "no," what was the approximate size for the third question?

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

A designed experiment is described. Identify the specified element of the experiment.

11) In a clinical trial, 780 participants suffering from high blood pressure were randomly assigned to one of three groups. Over a one–month period, the first group received a low dosage of an experimental drug, the second group received a high dosage of the drug, and the third group received a placebo. The diastolic blood pressure of each participant was measured at the beginning and at the end of the period and the change in blood pressure was recorded. Identify the levels of the factor.

11) _____

   A) The experimental drug
   B) High blood pressure, low blood pressure
   C) Placebo, low dosage, high dosage
   D) Diastolic blood pressure at the start, diastolic blood pressure at the end

12) An education researcher was interested in examining the effect of the teaching method and the effect of the particular teacher on students' scores on a reading test. In a study, there are two different teachers (Juliana and Felix) and three different teaching methods (method A, method B, and method C). The number of students participating in the study is 258. Students are randomly assigned to a teaching method and teacher. Identify the treatments.

12) _____

    A) Juliana and method A, Juliana and method B, Juliana and method C, Felix and method A, Felix and method B, Felix and method C
    B) Juliana, Felix, Sonia, and Helen
    C) Method A, method B, method C
    D) Teaching method and teacher

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

Provide an appropriate response.

13) In a clinical trial, each participant will receive a placebo, a low dosage of a drug, or a high dosage of the drug. The participants consist of 90 men and 90 women. The 90 men are randomly divided into three groups of 30 men each. Each group of men is randomly assigned to a different treatment (placebo, low dose, or high dose). Likewise, the 90 women are randomly divided into three groups of 30 women each. Each group of women is randomly assigned to a different treatment (placebo, low dose, or high dose). Is this a completely randomized design or a randomized block design? Explain your answer.

13) _____

14) An agricultural researcher wishes to compare the yield of four different varieties of wheat. 64 plots of land are available for an experiment. On each plot of land one of the varieties of wheat will be grown. At the end of the experiment the yield for the different varieties will be compared. 32 of the plots are at one site (site A) and the other 32 are at another site (site B). The soil at site A differs significantly from the soil at site B. If the researcher wishes to design an experiment using completely randomized design, how could the wheat varieties be assigned to the different plots?

14) _____

15) Describe a double–blind experiment and explain why blinding is used. Define the term "placebo effect" as part of the answer.

15) _____

1) B
2) C
3) A
4) To make the study a designed experiment, a researcher could start with a randomly chosen group of women who had been diagnosed with breast cancer in 1992. The women would then be divided into two groups: Caucasian women and African American women. The two groups of women would be required to receive the exact same cancer treatment over the next five years; then the survival rates would be recorded. This designed experiment may be infeasible because some of the women may not wish to receive the treatment provided versus a treatment that could be more appropriate to their case (radiation, chemotherapy, surgery) or any cancer treatment whatsoever. Controlling the treatment method may not be sufficient to establish whether there is a causation between race and survival rate. Other factors may affect the survival statistics, such as economic status, age, other health factors, etc.
5) B
6) A
7) 691, 3863, 3034, 978, 4584, 99, 362, 245, 1788, 4947, 471, 1562, 684, 2598
8) Answers will vary. Possible answer: The lecturer stands at the door of his classroom and tells the first 25 students to arrive to class that they are invited to a special bonus session of class to be held at some upcoming date. This is unlikely to yield a representative sample as the students who show up to class first could possibly be the ones who are more conscientious and hard-working. Or, the students may refuse to volunteer for an extra class period, so the lecturer's sample would be too small to be a representative sample.
9) B
10) i) This is a poll taken by calling randomly selected U.S. adults. Thus, the sampling design appears to be simple random sampling, although it is possible that a more complex, multi-stage design was used to ensure that various political, educational, or other types of groups were proportionately represented in the sample.
ii) The approximate sample size for the second question was 89% of 1010, or 899.
iii) The approximate sample size for the second question was 75% of 899, or 674.
11) C
12) A
13) This is a randomized block design. Explanations will vary.
14) Answers will vary. Possible answer: Randomly divide the 64 plots into four groups of 16 plots each. Randomly assign each group of plots to a different variety of wheat.
15) A double-blind experiment is one in which neither the subjects nor the researchers know who is getting the treatment. Blinding is when the subject does not know whether he or she is receiving a treatment or a placebo. Blinding is used to counteract the placebo effect in which an untreated subject believes he or she is receiving a treatment and reports an improvement in symptoms due to this belief.

Name_____

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

Provide an appropriate response.

1) The table below shows the number of new AIDS cases in the U.S. in each of the years 1989–1994.

Year	New AIDS cases
1989	33,643
1990	41,761
1991	43,771
1992	45,961
1993	103,463
1994	61,301

1) _____

Classify the study as either descriptive or inferential.
   A) Descriptive   B) Inferential

Answer the question.

2) A magazine publisher mails a survey to every subscriber asking about the quality of its subscription service. The total number of subscribers represents what?
   A) The population   B) The sample

2) _____

Identify the study as an observational study or a designed experiment.

3) At one hospital in 1992, 674 women were diagnosed with breast cancer. Five years later, 88% of the Caucasian women and 83% of the African American women were still alive.
   A) Designed experiment   B) Observational study

3) _____

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

Provide an appropriate response.

4) Fill in the following blanks: The two major types of statistics are _____ statistics and _____ statistics.

4) _____

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

List all possible samples from the specified population.

5) The finalists in an essay competition are Lisa (L), Melina (M), Ben (B),　　5) _____
Danny (D), Eric (E), and Joan (J). Consider these finalists to be a
population of interest. List the 15 possible samples (without replacement)
of size two from this population of six finalists.
    A) D,D D,E D,J E,L E,M E,B E,D E,E E,J J,L J,M J,B J,D J,E J,J
    B) L,L L,M L,B L,D L,E L,J M,M M,B
       M,D M,E M,J B,B B,D B,E B,J
    C) L,M L,B L,D L,E L,J M,B M,D
       M,E M,J B,D B,E B,J D,E D,J E,J
    D) L,L L,M L,B L,D L,E L,J M,L M,M
       M,B M,D M,E M,J B,L B,M B,B

Provide an appropriate response.

6) The finalists in an essay competition are Lisa (L), Melina (M), Ben (B),　　6) _____
Danny (D), Eric (E), and Joan (J). Consider these finalists to be a
population of interest. The possible samples (without replacement) of
size two that can be obtained from this population of six finalists are as
follows.

    L,M L,B L,D L,E L,J M,B M,D
    M,E M,J B,D B,E B,J D,E D,J E,J

If a simple random sampling method is used to obtain a sample of two of
the finalists, what are the chances of selecting Lisa and Danny?
    A) $\dfrac{1}{6}$ B) $\dfrac{1}{15}$ C) $\dfrac{1}{3}$ D) $\dfrac{2}{15}$

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

Use the random number table in Appendix A to obtain the required list of random numbers.

7) A market researcher is conducting a telephone poll. She has a list　　7) _____
of 581 registered voters and wishes to interview a random
sample of 12 of them. Construct a list of 12 random numbers
between 1 and 581 that can be used in obtaining the required
simple random sample. Use the random number table and use as
your starting point the digits 432 in row 13, columns 10–12.

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

Provide an appropriate response.

8) True or false? In simple random sampling, each possible sample is　　8) _____
equally likely to be the one obtained.
    A) True   B) False

9) From a group of 496 students, every 49th student starting with the 3rd student is selected. Identify the type of sampling used in this example.
9) _____
   A) Systematic random sampling
   B) Stratified sampling
   C) Cluster sampling
   D) Simple random sampling

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

10) Define the terms "stratified sampling", "systematic sampling" and "cluster sampling". Give examples for each.
10) _____

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

A designed experiment is described. Identify the specified element of the experiment.

11) In a clinical trial, 780 participants suffering from high blood pressure were randomly assigned to one of three groups. Over a one–month period, the first group received a low dosage of an experimental drug, the second group received a high dosage of the drug, and the third group received a placebo. The diastolic blood pressure of each participant was measured at the beginning and at the end of the period and the change in blood pressure was recorded. Identify the experimental units (subjects).
11) _____
   A) The three different groups
   B) The diastolic blood pressures of the participants
   C) The treatment (i.e., placebo, low dosage of drug, or high dosage of drug)
   D) The participants in the experiment

12) An education researcher was interested in examining the effect of the teaching method and the effect of the particular teacher on students' scores on a reading test. In a study, there are four different teachers (Juliana, Felix, Sonia, and Helen) and three different teaching methods (method A, method B, and method C). The number of students participating in the study is 258. Students are randomly assigned to a teaching method and teacher. Identify the response variable.
12) _____
   A) Method A, method B, method C
   B) Score on reading test
   C) Teaching method
   D) Teacher

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

Provide an appropriate response.

13) Explain the difference between an observational study and a designed experiment.
13) _____

14) Give an example of a designed experiment. In your experiment, identify the experimental units, the response variable, the factor(s), the levels of each factor, and the treatments.

14) _____

15) An agricultural researcher wishes to compare the yield of four different varieties of wheat. 64 plots of land are available for an experiment. On each plot of land one of the varieties of wheat will be grown. At the end of the experiment the yield for the different varieties will be compared. 32 of the plots are at one site (site A) and the other 32 are at another site (site B). The soil at site A differs significantly from the soil at site B. The researcher wishes to design an experiment. In this example, why might a randomized block design, with blocking by soil type, be preferable to a completely randomized design?

15) _____

1) A
2) A
3) B
4) descriptive and inferential
5) C
6) B
7) 432, 452, 534, 16, 343, 242, 428, 378, 163, 182, 293, 422
8) A
9) A
10) Stratified sampling subdivides the population into at least two different subpopulations (strata) and then draws a simple random sample from each stratum.

Systematic sampling divides the population size by the sample size and rounds the result down to the nearest whole number, m. Then, using a random–number table to obtain a number k between 1 and m, selects for the sample those members numbered k, k + m, k + 2m, and so on.

In cluster sampling, the population is divided into sections, then sections are randomly selected, and then all members of the randomly selected sections are surveyed. Examples will vary.
11) D
12) B
13) Answers will vary. Possible answer: In an observational study, there is no manipulation of the variables and the researchers simply observe characteristics and take measurements. In a designed experiment, the researchers manipulate variables by imposing treatments and controls before observing characteristics and taking measurements.
14) Answers will vary.
15) Answers will vary. Possible answer: by blocking, the researcher can isolate and remove the variation in yield which is due to different soil types. It will then be easier to detect the differences in yield among the four varieties of wheat, if such differences exist.

Name_____

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

Provide an appropriate response.

1) The table below shows the total number of births in the U.S. and the birth rate per 1,000 population in each of the years 1990–1994.

Year	Births	Birth Rate
1990	4,158,512	16.7
1991	4,110,907	16.3
1992	4,065,014	15.9
1993	4,000,240	15.5
1994	3,979,000	15.3

   Classify the study as either descriptive or inferential.
   A) Descriptive   B) Inferential

1) _____

Answer the question.

2) A magazine publisher mails a survey to every subscriber asking about the timeliness of its subscription service. The publisher finds that only 4% of the subscribers responded. This 4% represents what?
   A) The population   B) The sample

2) _____

Identify the study as an observational study or a designed experiment.

3) An educational researcher used school records to determine that, in one school district, 84% of children living in two–parent homes graduated high school while 75% of children living in single–parent homes graduated high school.
   A) Designed experiment   B) Observational study

3) _____

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

Provide an appropriate response.

4) Define observational study and designed experiment.

4) _____

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

List all possible samples from the specified population.

5) The members of a board of directors have the following roles: president (P), vice president (V), secretary (S), treasury (T), and fundraiser (F). Consider these board members to be a population of interest. List the 10 possible samples (without replacement) of size two from this population of five board members.

5) _____

    A) P,P P,V P,S P,T P,F V,V V,S V,T V,F S,S
    B) S,T S,F T,P T,V T,S T,F F,P F,V F,S F,T
    C) P,V P,S P,T P,F V,P V,S V,T V,F S,P S,V
    D) P,V P,S P,T P,F V,S V,T V,F S,T S,F T,F

Provide an appropriate response.

6) The members of a board of directors have the following roles: president (P), vice president (V), secretary (S), treasury (T), and fundraiser (F). Consider these board members to be a population of interest. The possible samples (without replacement) of size two that can be obtained from these five board members are as follows.

6) _____

P,V P,S P,T P,F V,S V,T V,F S,T S,F T,F

If a simple random sampling method is used to obtain a sample of two of the board members, what are the chances of selecting the secretary and the treasurer?

    A) $\frac{1}{10}$ B) $\frac{2}{5}$ C) $\frac{1}{5}$ D) $\frac{1}{20}$

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

Use the random number table in Appendix A to obtain the required list of random numbers.

7) A medical researcher is conducting clinical trials. Of the 60 people participating in the trial, 20 will receive a placebo, 20 will receive the experimental drug, and 20 will constitute the control group. The 20 people who will receive the drug will be selected at random. Construct a list of 20 random numbers between 1 and 60 which can be used in obtaining the required simple random sample. Use the random number table and use as your starting point the digits 54 in row 15, columns 20–21.

7) _____

Provide an appropriate response.

8) A store manager wishes to determine whether his customers would be prepared to pay a little extra for organic produce. He uses a random number table to choose 50 random numbers between 1 and 200. He stands outside the store on a Monday morning between 9:00 a.m. and 12:00 noon and interviews the people corresponding to the random numbers. For example random number 82 would correspond to the 82nd person to arrive. Do you think that the sample obtained in this way will be representative of all the store's customers?

8) _____

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

9) An education researcher randomly selects 38 schools from one school district and interviews all the teachers at each of the 38 schools. Identify the type of sampling used in this example.
   A) Stratified sampling
   B) Systematic random sampling
   C) Cluster sampling
   D) Simple random sampling

9) _____

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

10) Describe the advantages and disadvantages of cluster sampling as compared with simple random sampling.

10) _____

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

A designed experiment is described. Identify the specified element of the experiment.

11) In a clinical trial, 780 participants suffering from high blood pressure were randomly assigned to one of three groups. Over a one–month period, the first group received a low dosage of an experimental drug, the second group received a high dosage of the drug, and the third group received a placebo. The diastolic blood pressure of each participant was measured at the beginning and at the end of the period and the change in blood pressure was recorded. Identify the factor.
   A) The participants in the experiment
   B) The experimental drug
   C) The dosage of the drug
   D) Diastolic blood pressure

11) _____

12) An education researcher was interested in examining the effect of the
teaching method and the effect of the particular teacher on students'
scores on a reading test. In a study, there are four different teachers
(Juliana, Felix, Sonia, and Helen) and three different teaching methods
(method A, method B, and method C). The number of students
participating in the study is 258. Students are randomly assigned to a
teaching method and teacher. Identify the levels of the factor "teaching
method".

    12) _____

    A) Teaching method and teacher
    B) Method A, method B, method C
    C) Score on reading test
    D) Juliana, Felix, Sonia, and Helen

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

Provide an appropriate response.

13) An education researcher wishes to assess the effectiveness of
three different methods for teaching young children to read. The
380 children participating in the study are divided into three
groups. The study runs for six months. The children in the first
group are taught using method A, the children in the second
group are taught using method B, and the children in the third
group are taught using method C. At the end of the six months,
the reading ability of the children in the different groups is
assessed. Why might randomization be used when dividing the
children into three groups?

    13) _____

14) In a designed experiment, explain the difference between the
treatments and the factors.

    14) _____

15) In a clinical trial, each participant will receive a placebo, a low
dosage of a drug, or a high dosage of the drug. The participants
consist of 90 men and 90 women. The 90 men are randomly
divided into three groups of 30 men each. Each group of men is
randomly assigned to a different treatment (placebo, low dose, or
high dose). Likewise, the 90 women are randomly divided into
three groups of 30 women each. Each group of women is
randomly assigned to a different treatment (placebo, low dose, or
high dose). Is this a completely randomized design or a
randomized block design? Explain your answer.

    15) _____

1) A
2) B
3) B
4) In an observational study, researchers simply observe and measure specific characteristics as in a sample survey. In a designed experiment researchers apply some treatment and controls and then proceed to observe its effects on the subjects and take measurements.
5) D
6) A
7) 54, 2, 3, 41, 24, 19, 8, 30, 4, 6, 36, 15, 14, 40, 1, 5, 39, 42, 58, 10
8) No; explanations will vary. Possible answer: the sample was obtained from among people shopping on a Monday morning. That group is likely to include a relatively large number of people who do no have full time jobs and a relatively large number of parents. This group may tend to have different views than the entire population of customers. People with young children, for example, may be more concerned than most about the health effects of produce grown with pesticides.
9) C
10) Answers will vary. Possible answer: Cluster sampling can save time when members of the population are widely scattered geographically. The disadvantage is that members of a cluster may be more homogeneous than the members of the population as a whole and may not mirror the entire population.
11) B
12) B
13) Answers will vary. Possible answer: randomization is used in order to minimize the effects of possible confounding factors such as aptitude for reading of the children in the different groups. Randomizing helps to ensure that in each group there is a mixture of reading aptitudes. Differences in reading ability between the three groups at the end of the study can then more readily be attributed to the teaching method.
14) Answers will vary. Possible answer: the factors are the variables whose effect on the response variable is of interest. The treatments are the various experimental conditions. In a single–factor experiment, the treatments are the levels of the factor. In a multi–factor experiment, each treatment is a combination of levels of the factors.
15) This is a randomized block design. Explanations will vary.

Name_____

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

Classify the data as either qualitative or quantitative.

1) For the year 2006 , a large record company reported the following sales   1) _____
figures for various music media.

Media	Sales ($ millions)
CD	1477.3
CD single	1.8
MP3	65.9
Vinyl	2.6
Music video	531.4
Mini Disc	0.3
DVD	108.2
Cassette	3.4

What kind of data is provided by the information in the first column?
    A) Qualitative   B) Quantitative

Classify the data as either discrete or continuous.

2) The number of freshmen entering college in a certain year is 621.   2) _____
    A) Discrete   B) Continuous

Identify the variable.

3) For the year 2006 , a large record company reported the following sales   3) _____
figures for various music media.

Media	Sales ($ millions)
CD	1477.3
CD single	1.8
MP3	65.9
Vinyl	2.6
Music video	531.4
Mini Disc	0.3
DVD	108.2
Cassette	3.4

Identify the variable under consideration in the first column?
    A) media type   B) 1477.3
    C) sales   D) CD

Tell whether the statement is true or false.

4) A discrete variable always yields numerical values.   4) _____
    A) True   B) False

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

Provide an appropriate response.

5) Scott Tarnowski owns a pet grooming shop. His prices for grooming dogs are based on the size of the dog. His records from last year are summarized below. Construct a relative frequency distribution.
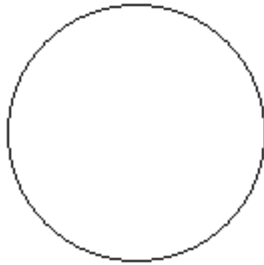
Class	Frequency
Large	345
Medium	830
Small	645

5) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.
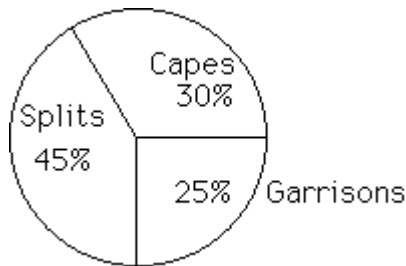
Construct a pie chart representing the given data set.

6) The following data give the distribution of the types of houses in a town containing 35,000 houses.
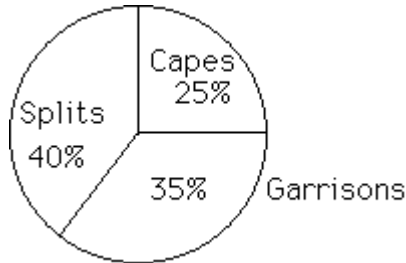
6) _____

House Type	Frequency	Relative Frequency
Cape	8750	0.25
Garrison	14,000	0.35
Split	12,250	0.40

A)

B)

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

Provide an appropriate response.

7) Explain the difference between a frequency distribution and a relative frequency distribution. Comment on the differences on the vertical axis scale. Given the same data set and the same classes, will the shapes of the frequency distribution and the relative frequency distribution be the same? You may draw a diagram to support your answer.

7) _____

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

Given the following "data scenario," decide which type of grouping (single–value, limit, or cutpoint) is probably the best.

    8) Number of Pets: The number of pets per family.   8) _____
        A) Single–value grouping   B) Cutpoint grouping
        C) None of these   D) Limit grouping

Use single–value grouping to organize these data into a frequency distribution.

    9) A car insurance company conducted a survey to find out how many car   9) _____
       accidents people had been involved in. They selected a sample of 32
       adults between the ages of 30 and 70 and asked each person how many
       accidents they had been involved in the past ten years. The following
       data were obtained.

       0 1 0 3 2 1 0 2
       1 1 1 0 2 0 4 1
       2 0 0 1 0 2 1 3
       1 3 0 0 1 0 5 4

       Construct a frequency distribution for the number of car accidents.

A)

Number of accidents	Frequency
1	10
2	5
3	3
4	2
5	1

B)

Number of accidents	Frequency
0	11
1	10
2	5
3	3
4	2
5	1

C)

Number of accidents	Frequency
0	11
1	10
2	5
3	3
4	1
5	1

D)

Number of accidents	Frequency
0	12
1	9
2	5
3	3
4	2
5	1

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

Use limit grouping to organize these data into a frequency distribution.

10) A medical research team studied the ages of patients who had strokes caused by stress. The ages of 34 patients who suffered stress strokes were as follows.

29 30 36 41 45 50 57 61 28 50 36 58
60 38 36 47 40 32 58 46 61 40 55 32
61 56 45 46 62 36 38 40 50 27

Construct a frequency distribution for these ages. Use 8 classes beginning with a lower class limit of 25 and class width of 5.

Age	Frequency

10) _____

Use cutpoint grouping to organize these data into a frequency distribution.

11) A medical research team studied the ages of patients who had strokes caused by stress. The ages of 34 patients who suffered stress strokes were as follows.

29 30 36 41 45 50 57 61 28 50 36 58
60 38 36 47 40 32 58 46 61 40 55 32
61 56 45 46 62 36 38 40 50 27

Construct a frequency distribution for these ages. Use 8 classes beginning with a lower class limit of 25.

Age	Frequency

11) _____

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

Provide the requested table entry.

12) The data in the following table reflect the amount of time 40 students in a section of Statistics 101 spend on homework each day. Determine the value that should be entered in the relative frequency column for the class 45–59.

12) _____

Homework time (minutes)	Number of students	Relative frequency
0–14	2	
15–29	4	
30–44	10	
45–59	16	
60–74	6	
75–89	2	

A) 0.4 　　　　　 B) 40% 　　　　　 C) 16 　　　　　 D) 16%

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

Construct the requested histogram.

13) The table gives the frequency distribution for the data involving the number of television sets per household for a sample of 100 U.S. households.

13) _____

# of TVs	Frequency
1	25
2	45
3	15
4	10
5	5

Construct a frequency histogram.
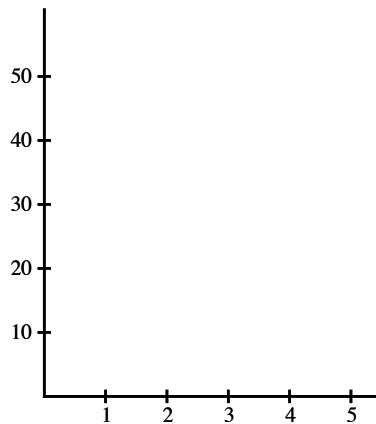
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Construct a dotplot for the given data.

14) Attendance records at a school show the number of days each student was absent during the year. The days absent for each student were as follows.

9 3 4 2 8 6 3 4 0 6 7 3 4 2 2

14) _____

A)

B)

C)

D)
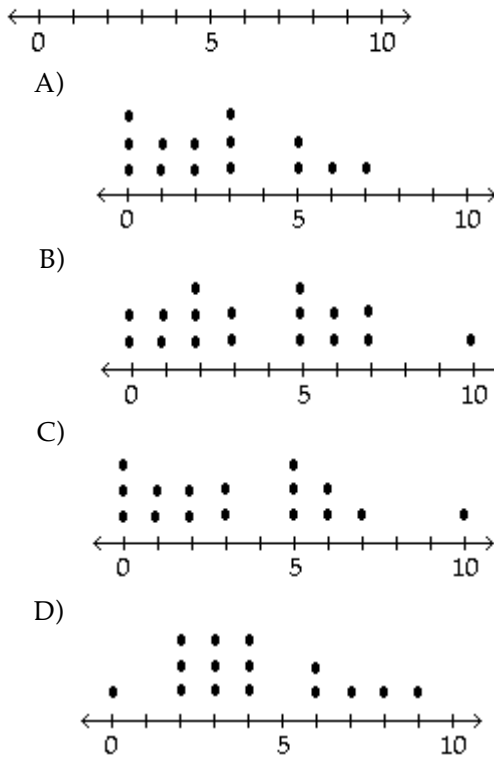
Construct a stem–and–leaf diagram for the given data.

15) The following data show the number of laps run by each participant in a marathon.

15) _____

46 65 55 43 51 48
57 30 43 49 32 56

A)

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

B)

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

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

Construct a relative–frequency polygon for the given data.

16) The table contains the frequency and relative–frequency distributions for the ages of the employees in a particular company department.

16) _____

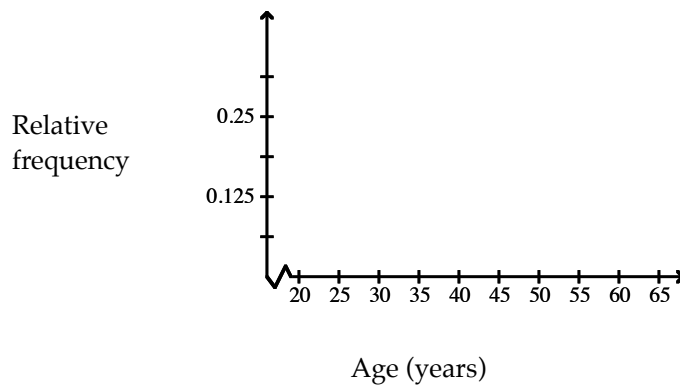| Age (years)	Frequency	Relative frequency
20–under 30	6	0.375
30–under 40	3	0.1875
40–under 50	4	0.25
50–under 60	2	0.125
60–under 70	1	0.0625

Relative frequency

0.25

0.125

20 25 30 35 40 45 50 55 60 65

Age (years)

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

Provide the requested response.

17) The table contains data from a study of daily study time for 40 students from Statistics 101. In constructing an ogive from the data, what quantity should be assigned to each axis.

17) _____

Minutes on homework	Number of students	Relative frequency	Cumulative relative frequency
0–under 15	2	0.05	0.05
15–under 30	4	0.10	0.15
30–under 45	8	0.20	0.35
45–under 60	18	0.45	0.80
60–under 75	4	0.10	0.90
75–under 90	4	0.10	1.00

A) Number of students on the x–axis and cumulative relative frequency on the y–axis

B) Minutes on homework on the x–axis and relative frequency on the y–axis

C) There is not enough data to decide.

D) Minutes on homework on the x–axis and cumulative relative frequency on the y–axis

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

Provide an appropriate response.

18) When organizing data into tables, what is the disadvantage of having too many classes? What is the disadvantage of having too few classes?

18) _____

19) The heights of adult women have a bell–shaped distribution. Give an example of a data set whose distribution is likely to be right skewed. Explain why you think the distribution will be skewed to the right.

19) _____

20) Explain in your own words why a truncated bar graph can be misleading.

20) _____

1) A
2) A
3) A
4) A
5)

Class	Frequency	Relative Frequency
Large	345	0.190
Medium	830	0.456
Small	645	0.354

6) B
7) Answers will vary. Possible answer: The frequency distribution and the relative frequency distribution for a given set of data both have the same shape but have different scales on the vertical axis. Given the scale for the frequency distribution, the scale for the relative frequency distribution is obtained by dividing each number on the vertical axis by n (the size of the data set).
8) A
9) B
10)

Age	Frequency
25 – 29	3
30 – 34	3
35 – 39	6
40 – 44	4
45 – 49	5
50 – 54	3
55 – 59	5
60 – 64	5

11)

Age	Frequency
25–under 30	3
30–under 35	3
35–under 40	6
40–under 45	4
45–under 50	5
50–under 55	3
55–under 60	5
60–under 65	5

12) A

13)

14) D
15) A
16)

Age (years)
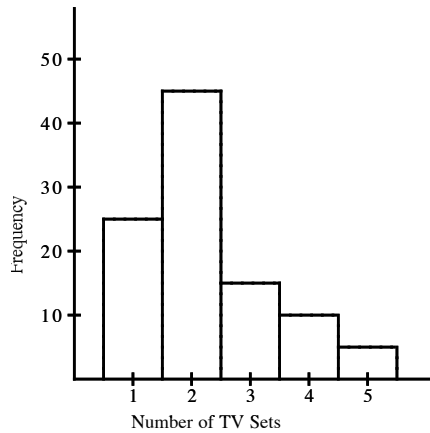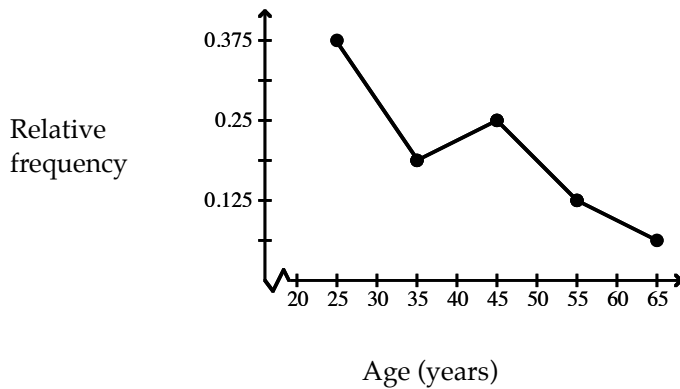
17) D
18) Answers will vary. Possible answer: With too many classes it may be difficult to get a clear picture of the data and to see trends in the data – the amount of information may be overwhelming. With too few classes, it may also be difficult to see important characteristics in the data as the data may have been over–summarized and too much information may have been lost.
19) Answers will vary. An example of a right skewed distribution might be the ages of all members (e.g. athletes, coaches) of a gymnastics team. A majority of the members would be quite young, however the older athletes and coaches will skew the distribution to the right.
20) Answers will vary. Possible answer: If a bar graph is truncated, the heights of the bars will not be in the correct proportions. This can create a misleading impression.

Name_____

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

Classify the data as either qualitative or quantitative.

1) The following table gives the top five movies at the box office this week.   1) _____

Rank	Last week	Movie title	Studio	Box office sales ($ millions)
1	N/A	Pirate Adventure	Movie Giant	35.2
2	2	Secret Agent Files	G.M.G.	19.5
3	1	Epic Super Hero Team	21st Century	14.3
4	5	Reptile Ride	Movie Giant	10.1
5	4	Must Love Cats	Dreamboat	9.9

What kind of data is provided by the information in the second column?
A) Qualitative
B) Quantitative

Classify the data as either discrete or continuous.

2) The average speed of cars passing a busy intersection between 4:30 P.M.   2) _____
and 6:30 P.M. on a Friday is 32.3 mi/h.
A) Discrete
B) Continuous

Identify the variable.

3) The following table gives the top five movies at the box office this week.   3) _____

Rank	Last week	Movie title	Studio	Box office sales ($ millions)
1	N/A	Pirate Adventure	Movie Giant	35.2
2	2	Secret Agent Files	G.M.G.	19.5
3	1	Epic Super Hero Team	21st Century	14.3
4	5	Reptile Ride	Movie Giant	10.1
5	4	Must Love Cats	Dreamboat	9.9

Identify the variable under consideration in the third column?
A) studio name
B) rank
C) Epic Super Hero Team
D) movie title

Tell whether the statement is true or false.

4) The set of possible values that a variable can take constitutes the data.   4) _____
A) True
B) False

Construct a frequency distribution for the given qualitative data.

5) The table shows the country represented by the winner of the 10,000   5) _____
meter run in the Summer Olympic Games in various years.

Year	Country
1912	Finland
1920	Finland
1924	Finland

1928   Finland
1932   Poland
1936   Finland
1948   Czechoslovakia
1952   Czechoslovakia
1956   USSR
1960   USSR
1964   United States
1968   Kenya
1972   Finland
1976   Finland
1980   Ethiopia
1984   Italy
1988   Morocco
1992   Morocco

A)

Country	Frequency
Finland	6
Poland	1
Czechoslovakia	2
USSR	2
United States	1
Kenya	1
Ethiopia	1
Italy	1
Morocco	2

B)

Country	Frequency
Finland	7
Poland	1
Czechoslovakia	2
USSR	2
United States	1
Ethiopia	1
Italy	1
Morocco	2

C)

Country	Frequency
Finland	7
Poland	1
Czechoslovakia	2
USSR	2
United States	1
Kenya	1
Ethiopia	1
Italy	1
Morocco	2