Exam

Name_____

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

Provide an appropriate response.
1) What is a designed experiment?   1) _____

   Answer: A designed experiment is a controlled study in which treatments are applied to
           experimental units, and the effect of varying these treatments on a response variable
           is observed.

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

Determine what type of observational study is described. Explain.
2) Researchers wanted to determine whether there was an association between high blood pressure   2) _____
   and the suppression of emotions. The researchers looked at 1800 adults enrolled in a Health
   Initiative Observational Study. Each person was interviewed and asked about their response to
   emotions. In particular they were asked whether their tendency was to express or to hold in anger
   and other emotions. The degree of suppression of emotions was rated on a scale of 1 to 10. Each
   person's blood pressure was also measured. The researchers analyzed the results to determine
   whether there was an association between high blood pressure and the suppression of emotions.
      A) cohort; Individuals are observed over a long period of time.
      B) case-control; Individuals are asked to look back in time.
      C) cross-sectional; Information is collected at a specific point in time.
   Answer: C

Provide an appropriate response.
3) A medical journal published the results of an experiment on anxiety. The experiment investigated   3) _____
   the effects of a controversial new therapy for anxiety. Researchers measured the anxiety levels of 96
   adult women who suffer moderate conditions of the disorder. After the therapy, the researchers
   again measured the women's anxiety levels. The differences between the the pre- and post-therapy
   anxiety levels were reported. What is the response variable in this experiment?
      A) The differences between the the pre- and post-therapy anxiety levels
      B) The disorder (anxiety or no anxiety).
      C) The 96 adult women who suffer from anxiety.
      D) The therapy.
   Answer: A

Classify the variable as qualitative or quantitative.
4) the weights of cases loaded onto an airport conveyor belt   4) _____
      A) quantitative   B) qualitative
   Answer: A

1

Identify the type of sampling used.

5) A writer for an art magazine randomly selects and interviews fifty male and fifty female artists.   5) _____
What sampling technique is used?
  A) systematic
  B) convenience
  C) cluster
  D) stratified
  E) simple random

Answer: D

Provide an appropriate response.

6) An experiment in which neither the experimental unit nor the researcher in contact with the   6) _____
experimental unit knows which treatment the experimental unit is receiving is called a
_____ .
  A) single-blind experiment   B) double-blind experiment
  C) matched-pairs design   D) randomized block design

Answer: B

Classify the variable as qualitative or quantitative.

7) the native languages of students in an English class   7) _____
  A) qualitative   B) quantitative

Answer: A

Determine the level of measurement of the variable.

8) the medal received (gold, silver, bronze) by an Olympic gymnast   8) _____
  A) interval   B) ordinal   C) ratio   D) nominal

Answer: B

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

Provide an appropriate response.

9) A survey of 1,805 American households found that 71% of the households own a DVD   9) _____
recorder. Identify the population, the sample, and the individuals in the study.

Answer: population: collection of all American households; sample: collection of 1,805
American households surveyed; individuals: each household

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

10) True or False: Observational studies allow the researcher to claim causation, not just association.   10) _____
  A) False   B) True

Answer: A

Determine the level of measurement of the variable.

11) time spent playing basketball   11) _____
  A) ordinal   B) interval   C) ratio   D) nominal

Answer: C

Determine whether the study depicts an observational study or an experiment.

12) A pollster obtains a sample of students and asks them how they will vote on an upcoming referendum.

    A) observational study   B) experiment

12) _____

Answer: A

Determine whether the quantitative variable is discrete or continuous.

13) the number of phone calls to the police department on any given day

    A) continuous   B) discrete

13) _____

Answer: B

Provide an appropriate response.

14) A student is asked to rate a guest speaker's ability to communicate on a scale of poor-average-good-excellent. The student is to fill in a corresponding circle on a bubble form. This is an example of collecting what type of data?

    A) continuous   B) discrete   C) qualitative   D) insightful

14) _____

Answer: C

15) Which of the following is not true of statistics?

    A) Statistics can be used to organize and analyze information.
    B) Statistics is about providing a measure of confidence in any conclusions
    C) Statistics is used to answer questions with 100% certainty.
    D) Statistics involves collecting and summarizing data.

15) _____

Answer: C

16) Which type of bias occurs because the individuals tend to favor one part of the population over another?

    A) response bias   B) nonresponse bias
    C) sampling bias   D) no bias

16) _____

Answer: C

Determine whether the quantitative variable is discrete or continuous.

17) the number of bottles of juice sold in a cafeteria during lunch

    A) continuous   B) discrete

17) _____

Answer: B

Provide an appropriate response.

18) The number of violent crimes committed in a city on a given day in a random sample of 50 days is a _____ random variable.

    A) continuous   B) discrete

18) _____

Answer: B

Determine whether the underlined value is a parameter or a statistic.

19) The average age of the 65 students in Ms. Hope's political science class is <u>21 years 8 months.</u>

    A) parameter   B) statistic

19) _____

Answer: A

Classify the variable as qualitative or quantitative.
  20) the temperatures of cups of coffee served at a restaurant   20) _____
      A) quantitative   B) qualitative

      Answer: A

Provide an appropriate response.
  21) Classify the following random variable: telephone area codes   21) _____
      A) experimental data   B) quantitative continuous data
      C) qualitative data   D) quantitative discrete data

      Answer: C

Determine the level of measurement of the variable.
  22) ranking (first place, second place, etc.) of contestants in a singing competition   22) _____
      A) nominal   B) ordinal   C) interval   D) ratio

      Answer: B

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

Provide an appropriate response.
  23) A local hardware store wants to know if its customers are satisfied with the customer   23) _____
      service they receive. The store posts an interviewer at the front of the store to ask the first
      140 shoppers who leave the store, "How satisfied, on a scale of 1 to 10, were you with this
      store's customer service?" Determine the type of bias.

      Answer: Sampling bias; the customers are not chosen through a random sample.

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

Identify the type of sampling used.
  24) A travel industry researcher interviews all of the passengers on five randomly selected cruises.   24) _____
      What sampling technique is used?
      A) simple random
      B) systematic
      C) stratified
      D) convenience
      E) cluster

      Answer: E

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

Provide an appropriate response.
  25) A survey of 1,242 American households found that 32% of the households own at least two   25) _____
      bicycles. Identify the population, the sample, and the individuals in the study.

      Answer: population: collection of all American households; sample: collection of 1,242
               American households surveyed; individuals: each household

4

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

Determine what type of observational study is described. Explain.

26) A researcher wanted to determine whether colon cancer was associated with eating meat. He   26) _____
selected a sample of 500 men with colon cancer and an equal number of men without colon cancer.
The two groups were matched - in other words they were similar in terms of age, occupation,
income, and exercise levels. Histories on the amount of meat consumed over the previous twenty
years were obtained for all men. The total amount of meat that each man eaten in the previous
twenty years was estimated. The meat consumption was compared for the two groups.
  A) cross-sectional; Information is collected at a specific point in time.
  B) cohort; Individuals are observed over a long period of time.
  C) case-control; Individuals are asked to look back in time

Answer: C

Provide an appropriate response.

27) A medical journal published the results of an experiment on depression. The experiment   27) _____
investigated the effects of a controversial new therapy for depression. Researchers measured the
depression levels of 72 adult women who suffer moderate conditions of the disorder. After the
therapy, the researchers again measured the women's depression levels. The differences between
the the pre- and post-therapy depression levels were reported. What type of experimental design
is this?
  A) randomized block design   B) single-blind design
  C) matched-pairs design   D) completely randomized design

Answer: C

Determine whether the study depicts an observational study or an experiment.

28) A scientist was studying the effects of a new fertilizer on crop yield. She randomly assigned half of   28) _____
the plots on a farm to group one and the remaining plots to group two. On the plots in group one,
the new fertilizer was used for a year. On the plots in group two, the old fertilizer was used. At the
end of the year the average crop yield for the plots in group one was compared with the average
crop yield for the plots in group two.
  A) experiment   B) observational study

Answer: A

Determine the level of measurement of the variable.

29) the day of the month   29) _____
  A) ratio   B) nominal   C) ordinal   D) interval

Answer: D

30) the year of manufacture of a car   30) _____
  A) interval   B) ordinal   C) nominal   D) ratio

Answer: A

Identify the type of sampling used.

31) In a recent Twitter survey, participants were asked to answer "yes" or "no" to the question "Are you   31) _____
in favor of stricter gun control?" 6571 responded "yes" while 5237 responded "no". What sampling
technique was used?
- A) simple random
- B) stratified
- C) convenience
- D) systematic
- E) cluster

Answer: C

Determine whether the quantitative variable is discrete or continuous.

32) the low temperature in degrees Fahrenheit on January 1st in Cheyenne, Wyoming   32) _____
- A) continuous   B) discrete

Answer: A

Classify the variable as qualitative or quantitative.

33) the numbers on the shirts of a football team   33) _____
- A) qualitative   B) quantitative

Answer: A

Provide an appropriate response.

34) A medical journal published the results of an experiment on anxiety. The experiment investigated   34) _____
the effects of a controversial new therapy for anxiety. Researchers measured the anxiety levels of 79
adult women who suffer moderate conditions of the disorder. After the therapy, the researchers
again measured the women's anxiety levels. The differences between the the pre- and post-therapy
anxiety levels were reported. Identify the experimental units.
- A) the differences between the pre- and post-therapy anxiety levels
- B) the disorder (anxiety or no anxiety)
- C) the therapy time period (pre or post)
- D) the 79 adult women who suffer from anxiety

Answer: D

35) A drug company wanted to test a new depression medication. The researchers found 500 adults   35) _____
aged 25-35 and randomly assigned them to two groups. The first group received the new drug,
while the second received a placebo. After one month of treatment, the percentage of each group
whose depression symptoms decreased was recorded and compared. Identify the experimental
units.
- A) The 500 adults aged 25-35.
- B) The one month treatment time
- C) The drug (medication or placebo).
- D) The percentage who had decreased depression symptoms.

Answer: A

36) Parking at a large university has become a very big problem. University administrators are interested in determining the average parking time (e.g. the time it takes a student to find a parking spot) of its students. An administrator inconspicuously followed 190 students and carefully recorded their parking times. Identify the population of interest to the university administration.

    A) the parking times of the entire set of students that park at the university
    B) the parking times of the 190 students from whom the data were collected
    C) the students that park at the university between 9 and 10 AM on Wednesdays
    D) the entire set of faculty, staff, and students that park at the university

36) _____

Answer: A

37) The city council of a small town needs to determine if the town's residents will support the building of a new library. The council decides to conduct a survey of a sample of the town's residents. Which one of the following procedures would be least appropriate for obtaining a sample of the town's residents?

    A) Survey every 15th person who enters the old library on a given day.
    B) Survey a random sample of persons within each neighborhood of the town.
    C) Survey 300 individuals who are randomly selected from a list of all people living in the state in which the town is located.
    D) Survey a random sample of librarians who live in the town.

37) _____

Answer: D

Identify the type of sampling used.

38) Thirty-five math majors, 34 music majors and 65 history majors are randomly selected from 244 math majors, 453 music majors and 550 history majors at the state university. What sampling technique is used?

    A) convenience
    B) simple random
    C) stratified
    D) systematic
    E) cluster

38) _____

Answer: C

39) A statisticsstudent interviews everyone in his apartment building to determine what percent of people own a cell phone. What sampling technique is used?

    A) systematic
    B) convenience
    C) stratified
    D) simple random
    E) cluster

39) _____

Answer: B

Provide an appropriate response.

40) When the effects of the explanatory variable upon the response variable cannot be determined, then

    A) there is sampling error.   B) confounding has occurred.
    C) the claim is invalid.   D) a lurking variable is present.

40) _____

Answer: B

Classify the variable as qualitative or quantitative.

41) the bank account numbers of the students in a class

    A) qualitative   B) quantitative

41) _____

Answer: A

Identify the type of sampling used.

42) A sample consists of every 35th worker from a group of 5000 workers. What sampling technique was used?

42) _____

    A) convenience
    B) cluster
    C) stratified
    D) simple random
    E) systematic

Answer: E

Solve the problem.

43) An international relations professor is supervising four master's students.   Information about the students is summarized in the table.

43) _____

Student Name	Student Number	Area of Interest	GPA
Anna	914589205	Africa	3.23
Pierre	981672635	Middle East	3.50
Juan	906539012	Latin America	3.80
Yoko	977530271	Asia	3.71

Identify the variables and determine whether each variable is quantitative or qualitative.
    A) student number: qualitative; area of interest: qualitative; GPA: quantitative
    B) student number: quantitative; area of interest: qualitative; GPA: qualitative
    C) student number: quantitative; area of interest: qualitative; GPA: quantitative
    D) student number: qualitative; area of interest: qualitative; GPA: qualitative

Answer: A

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

Provide an appropriate response.

44) An online newspaper conducted a survey by asking, "Do you support the lowering of air quality standards if it could cause the death of millions of innocent people from pollution related diseases?" Determine the type of bias.

44) _____

Answer: Response bias; poorly worded question

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

45) The top 38 cities in Wisconsin as determined by population are given below. Select a random sample of four cities from the list below using the two digit list of random numbers provided. Begin with the uppermost left random number and proceed down each column. When a column is complete, use the numbers at the top of the next right column and proceed down that column. Information was obtained from the web site http://www.citypopulation.de/USA-Wisconsin.html.

45) _____

Wisconsin Cities by Population

1	Milwaukee	9	Eau Claire	17	New Berlin	25	West Bend	33	Watertown
2	Madison	10	Janesville	18	Wausau	26	Superior	34	Muskego
3	Green Bay	11	West Allis	19	Greenfield	27	Mount Pleasant	35	De Pere
4	Kenosha	12	La Crosse	20	Beloit	28	Neenah	36	Fitchburg
5	Racine	13	Sheboygan	21	Manitowoc	29	Stevens Point	37	South Milwaukee
6	Appleton	14	Wauwatosa	22	Menomonee Falls	30	Caledonia	38	Grand Chute
7	Waukesha	15	Fond du Lac	23	Franklin	31	Sun Prairie		
8	Oshkosh	16	Brookfield	24	Oak Creek	32	Mequon		

Random Numbers

21	49	6	6	19	15	11	17
12	43	4	31	7	18	1	43
23	30	2	24	21	18	6	48
44	12	20	32	2	28	12	38
8	30	38	43	41	29	3	13

A) Manitowoc, Appleton, Greenfield, Fond du Lac.
B) Manitowoc, La Crosse, Franklin, Oshkosh.
C) Milwaukee, Madison, Green Bay, Kenosha.
D) Milwaukee, Eau Claire, New Berlin, West Bend.

Answer: B

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

46) Administrators at a large university want to know the average debt incurred by their graduates. Surveys were mailed to 260 graduating seniors asking them to report their total student loan debt. Identify the population, sample, and individuals in the study.

46) _____

Answer: The population of interest is the student loan debt incurred by all graduates of the university. The sample is student loan debt of the 260 graduating seniors that were collected by the university administrators. The individuals are each graduating senior whose student loan debt was recorded.

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

47) The variable measured in the experiment is called _____ .

47) _____

A) the predictor variable
B) the response variable
C) the treatment
D) a sampling unit

Answer: B

Determine whether the underlined value is a parameter or a statistic.

48) 51.6% of all the residents of Idlington Garden City are female.

48) _____

A) parameter
B) statistic

Answer: A

Identify the type of sampling used.

49) At a local technical school, five auto repair classes are randomly selected and all of the students   49) _____
from each class are interviewed. What sampling technique is used?

    A) simple random
    B) systematic
    C) stratified
    D) convenience
    E) cluster

Answer: E

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

Provide an appropriate response.

50) What is a factor?   50) _____

Answer: A factor is the variable whose effect on the response variable is to be assessed by the experimenter.

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

Determine the level of measurement of the variable.

51) the native language of a tourist   51) _____

    A) ratio   B) nominal   C) ordinal   D) interval

Answer: B

Solve the problem.

52) A bicycle manufacturer produces four different bicycle models. Information is summarized in the   52) _____
table below:

Model	Series Number	Weight	Style
Ascension	A120	32	Mountain
Road Runner	B640	22	Road
All Terrain	C300	27	Hybrid
Class Above	D90	17	Racing

Identify the variables and determine whether each variable is quantitative or qualitative.

    A) series number: quantitative; weight: quantitative; style: qualitative
    B) series number: qualitative; weight: quantitative; style: qualitative
    C) series number: qualitative; weight: qualitative; style: qualitative
    D) series number: quantitative; weight: qualitative; style: qualitative

Answer: B

Provide an appropriate response.

53) Select a random sample of five state capitals from the list below using the two digit list of random numbers provided. Begin with the uppermost left random number and proceed down each column. When a column is complete, use the numbers at the top of the next right column and proceed down that column.

53) _____

State Capitals

1	Albany, NY	11	Charleston, WV	21	Hartford, CT	31	Madison, WI	41	Richmond, VA
2	Annapolis, MD	12	Cheyenne, WY	22	Helena, MT	32	Montgomery, AL	42	Sacramento, CA
3	Atlanta, GA	13	Columbia, SC	23	Honolulu, HI	33	Montpelier, VT	43	Salem, OR
4	Augusta, ME	14	Columbus, OH	24	Indianapolis, IN	34	Nashville, TN	44	Salt Lake City, UT
5	Austin, TX	15	Concord, NH	25	Jackson, MS	35	Oklahoma City, OK	45	Santa Fe, NM
6	Baton Rouge, LA	16	Denver, CO	26	Jefferson City, MO	36	Olympia, WA	46	Springfield, IL
7	Bismarck, ND	17	Des Moines, IA	27	Juneau, AK	37	Phoenix, AZ	47	St. Paul, MN
8	Boise, ID	18	Dover, DE	28	Lansing, MI	38	Pierre, SD	48	Tallahassee, FL
9	Boston, MA	19	Frankfort, KY	29	Lincoln, NE	39	Providence, RI	49	Topeka KS
10	Carson City, NV	20	Harrisburg, PA	30	Little Rock, AR	40	Raleigh, NC	50	Trenton, NJ

Random Numbers

46	81	17	60	92	59	40	9
53	78	45	14	53	78	8	43
3	99	46	86	41	42	36	95
39	14	16	59	84	18	5	48
45	41	77	91	11	43	76	28

A) Boston, MA; Concord, NH; Dover DE; Santa Fe, NM; Richmond, VA.
B) Carson City NV; Boise ID; Atlanta, GA; Cheyenne, WY; Boston, MA.
C) Springfield, IL; Atlanta,GA; Providence, RI; Santa Fe, NM; Columbus OH.
D) Springfield, IL; Des Moines, IA; Boston, MA; Santa Fe, NM; Columbus OH.

Answer: C

54) Which branch of statistics deals with the organization and summarization of collected information?   54) _____
    A) Inferential statistics   B) Computational statistics
    C) Descriptive statistics   D) Survey design

Answer: C

Identify the type of sampling used.

55) Based on 9,000 responses from 44,500 questionnaires sent to all its members, a major medical association estimated that the annual salary of its members was $122,500 per year. What sampling technique was used?   55) _____
    A) simple random
    B) convenience
    C) stratified
    D) systematic
    E) cluster

Answer: A

Determine what type of observational study is described. Explain.

56) Vitamin D is important for the metabolism of calcium and exposure to sunshine is an important source of vitamin D. A researcher wanted to determine whether osteoperosis was associated with a lack of exposure to sunshine. He selected a sample of 250 women with osteoperosis and an equal number of women without osteoperosis. The two groups were matched - in other words they were similar in terms of age, diet, occupation, and exercise levels. Histories on exposure to sunshine over the previous twenty years were obtained for all women. The total number of hours that each woman had been exposed to sunshine in the previous twenty years was estimated. The amount of exposure to sunshine was compared for the two groups.

56) _____

A) cross-sectional; Information is collected at a specific point in time.
B) cohort; Individuals are observed over a long period of time.
C) case-control; Individuals are asked to look back in time

Answer: C

Identify the type of sampling used.

57) To avoid working late, the plant foreman inspects the first 30 microwaves produced that day. What sampling technique was used?

57) _____

A) simple random
B) systematic
C) convenience
D) cluster
E) stratified

Answer: C

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

Solve the problem.

58) For a poll of voters regarding a referendum calling for renewing the residential renewable energy tax credit, design a sampling method to obtain the individuals in the sample.

58) _____

Answer: Answers will vary. One option would be stratified sampling. Since this is a national issue, different geographical locations are likely to have similar views.

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

Provide an appropriate response.

59) A drug company wanted to test a new indigestion medication. The researchers found 700 adults aged 25-35 and randomly assigned them to two groups. The first group received the new drug, while the second received a placebo. After one month of treatment, the percentage of each group whose indigestion symptoms decreased was recorded and compared. What is the response variable in this experiment?

59) _____

A) The type of drug (medication or placebo).
B) The one month treatment time.
C) The percentage who had decreased indigestion symptoms.
D) The 700 adults aged 25-35.

Answer: C

Identify the type of sampling used.

60) An education researcher randomly selects 90 of the nation's junior colleges and interviews all of the professors at each school. What sampling technique was used?

60) _____

    A) cluster
    B) systematic
    C) simple random
    D) stratified
    E) convenience

Answer: A

Provide an appropriate response.

61) The legal profession conducted a study to determine the percentage of cardiologists who had been sued for malpractice in the last five years. The sample was randomly chosen from a national directory of doctors. Identify the individuals in the study.

61) _____

    A) all cardiologists in the directory
    B) the responses: have been sued/have not been sued for malpractice in the last five years
    C) each cardiologist selected from the directory
    D) the doctor's area of expertise (i.e., cardiology, pediatrics, etc.)

Answer: C

62) The policy committee at State University has 6 members: Jose, John, Prof. Rise, Dr. Hernandez, LaToyna, and Ming. A subcommittee of two members must be formed to investigate the visitation policy in the dormitories. List all possible simple random samples of size 2.

62) _____

    A) Jose and John, John and Prof. Rise, Prof. Rise and Dr. Hernandez, Dr. Hernandez and LaToyna, LaToyna and Ming
    B) Jose and John, Prof. Rise and Dr. Hernandez, LaToyna and Ming
    C) Jose and John, Jose and Prof. Rise, Jose and Dr. Hernandez, Jose and LaToyna, Jose and Ming, John and Prof. Rise, John and Dr. Hernandez, John and LaToyna, John and Ming, Prof. Rise and Dr. Hernandez, Prof. Rise and LaToyna, Prof. Rise and Ming, Dr. Hernandez and LaToyna, Dr. Hernandez and Ming, LaToyna and Ming
    D) Jose and John, Jose and Prof. Rise, Jose and Dr. Hernandez, Jose and LaToyna, Jose and Ming

Answer: C

Classify the variable as qualitative or quantitative.

63) the colors of book covers on a bookshelf

63) _____

    A) qualitative   B) quantitative

Answer: A

Determine whether the study depicts an observational study or an experiment.

64) A researcher obtained a random sample of 100 smokers and a random sample of 100 nonsmokers. After interviewing all 200 participants in the study, the researcher compared the rate of depression among the smokers with the rate of depression among nonsmokers.

64) _____

    A) observational study   B) experiment

Answer: A

Determine what type of observational study is described. Explain.

65) Can money buy happiness? A researcher wanted to determine whether there was any association
between economic status and happiness. She selected a sample of 1000 adults and interviewed
them. Each person was asked about their financial situation and their level of happiness was
evaluated. The researcher analyzed the results to determine whether there was an association
between economic status and happiness.

   A) cross-sectional; Information is collected at a specific point in time.
   B) case-control; Individuals are asked to look back in time.
   C) cohort; Individuals are observed over a long period of time.

65) _____

Answer: A

Provide an appropriate response.

66) A farmer wishes to test the effects of a new fertilizer on her soybean yield. She has four equal-sized
plots of land-- one with sandy soil, one with rocky soil, one with clay-rich soil, and one with
average soil. She divides each of the four plots into three equal-sized portions and randomly labels
them A, B, and C. The four A portions of land are treated with her old fertilizer. The four B portions
are treated with the new fertilizer, and the four C's are treated with no fertilizer. At harvest time,
the soybean yield is recorded for each section of land. Identify the experimental units.

   A) the four types of soil
   B) the three types of fertilizer
   C) the soybean plants on the various plots of land
   D) the soybean yield at harvest time

66) _____

Answer: C

Determine whether the quantitative variable is discrete or continuous.

67) the speed of a car on a Boston tollway during rush hour traffic

   A) continuous   B) discrete

67) _____

Answer: A

Determine whether the study depicts an observational study or an experiment.

68) The personnel director at a large company would like to determine whether the company cafeteria
is widely used by employees. She calls each employee and asks them whether they usually bring
their own lunch, eat at the company cafeteria, or go out for lunch.

   A) observational study   B) experiment

68) _____

Answer: A

Provide an appropriate response.

69) A medical journal published the results of an experiment on anorexia. The experiment investigated
the effects of a controversial new therapy for anorexia. Researchers measured the anorexia levels of
39 adult women who suffer moderate conditions of the disorder. After the therapy, the researchers
again measured the women's anorexia levels. The differences between the the pre- and
post-therapy anorexia levels were reported. What is the treatment in this experiment?

   A) the therapy
   B) the differences between the the pre- and post-therapy anorexia levels
   C) the 39 adult women who suffer from anorexia
   D) the disorder (anorexia or no anorexia)

69) _____

Answer: A

Determine whether the underlined value is a parameter or a statistic.

70) A study of 2,700 college students in the city of Pemblington found that 9% had been victims of violent crimes.

    A) statistic   B) parameter

Answer: A

70) _____

71) Mark retired from competitive athletics last year. In his whole career as a sprinter he had competed in the 100-meters event a total of 328 times. His average time for these 328 races was 10.25 seconds.

    A) parameter   B) statistic

Answer: A

71) _____

Provide an appropriate response.

72) A farmer wishes to test the effects of a new fertilizer on her tomato yield. She has four equal-sized plots of land-- one with sandy soil, one with rocky soil, one with clay-rich soil, and one with average soil. She divides each of the four plots into three equal-sized portions and randomly labels them A, B, and C. The four A portions of land are treated with her old fertilizer. The four B portions are treated with the new fertilizer, and the four C's are treated with no fertilizer. At harvest time, the tomato yield is recorded for each section of land. What is the treatment in this experiment?

    A) the section of land (A, B, or C)
    B) the fertilizers
    C) the tomato yield recorded for each section of land
    D) the four types of soil

Answer: B

72) _____

Classify the variable as qualitative or quantitative.

73) the number of seats in a school auditorium

    A) qualitative   B) quantitative

Answer: B

73) _____

Determine the level of measurement of the variable.

74) an evaluation received by a physics student (excellent, good, satisfactory, or poor).

    A) ratio   B) nominal   C) interval   D) ordinal

Answer: D

74) _____

Provide an appropriate response.

75) A manufacturer of cellular phones has decided that an assembly line is operating satisfactorily if less than 0.01% of the phones produced per day are defective. To check the quality of a day's production, the company decides to randomly sample 60 phones from a day's production to test for defects. Define the population of interest to the manufacturer.

    A) the 60 responses: defective or not defective
    B) the 0.01% of the phones that are defective
    C) the 60 phones sampled and tested
    D) all the phones produced during the day in question

Answer: D

75) _____

Determine whether the quantitative variable is discrete or continuous.

76) the weight of a player on the wrestling team

    A) discrete   B) continuous

Answer: B

76) _____

Identify the type of sampling used.

77) A market researcher randomly selects 400 homeowners under 60 years of age and 200 homeowners over 60 years of age. What sampling technique was used?
    A) simple random
    B) systematic
    C) convenience
    D) cluster
    E) stratified

77) _____

Answer: E

Provide an appropriate response.

78) A drug company wanted to test a new indigestion medication. The researchers found 300 adults aged 25-35 and randomly assigned them to two groups. The first group received the new drug, while the second received a placebo. After one month of treatment, the percentage of each group whose indigestion symptoms decreased was recorded and compared. What is the treatment in this experiment?
    A) The 300 adults aged 25-35.
    B) The drug.
    C) The percentage who had decreased indigestion symptoms.
    D) The one month treatment time.

78) _____

Answer: B

79) Parking at a large university has become a very big problem. University administrators are interested in determining the average parking time (e.g. the time it takes a student to find a parking spot) of its students. An administrator inconspicuously followed 130 students and carefully recorded their parking times. Identify the sample of interest to the university administration.
    A) type of car (import or domestic)   B) parking times of the 130 students
    C) location of the parking spot   D) parking time of a student

79) _____

Answer: B

Determine whether the underlined value is a parameter or a statistic.

80) In a survey conducted in the town of Atherton, <u>23%</u> of adult respondents reported that they had been involved in at least one car accident in the past ten years.
    A) parameter   B) statistic

80) _____

Answer: B

Provide an appropriate response.

81) _____ is a combination of the values of factors in an experiment.
    A) The design   B) A treatment
    C) The factor level   D) The sampling design

81) _____

Answer: B

Determine the level of measurement of the variable.

82) an officer's rank in the military
    A) ratio   B) interval   C) nominal   D) ordinal

82) _____

Answer: D

Provide an appropriate response.

83) A drug company wanted to test a new depression medication. The researchers found 700 adults aged 25-35 and randomly assigned them to two groups. The first group received the new drug, while the second received a placebo. After one month of treatment, the percentage of each group whose depression symptoms decreased was recorded and compared. What type of experimental design is this?

    A) completely randomized design   B) randomized block design

    C) single-blind design   D) matched-pairs design

83) _____

Answer: A

84) True or False: Experiments intentionally manipulate the value of an explanatory variable.

    A) True   B) False

84) _____

Answer: A

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

85) Before opening a new dealership, an auto manufacturer wants to gather information about car ownership and driving habits of the local residents. The marketing manager of the company randomly selects 1000 households from all households in the area and mails a questionnaire to them. Of the 1000 surveys mailed, she receives 145 back. Determine the type of bias.

85) _____

Answer: Nonresponse bias

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

86) The object upon which the treatment is applied is called _____ .

    A) a treatment   B) the factor

    C) an experimental unit   D) the predictor variable

86) _____

Answer: C

Determine whether the study depicts an observational study or an experiment.

87) A medical researcher obtains a sample of adults suffering from diabetes. She randomly assigns 42 people to a treatment group and 42 to a placebo group. The treatment group receives a medication over a period of three months and the placebo group receives a placebo over the same time frame. At the end of three months the patients' symptoms are evaluated.

    A) experiment   B) observational study

87) _____

Answer: A

Provide an appropriate response.

88) A farmer wishes to test the effects of a new fertilizer on her potato yield. She has four equal-sized plots of land-- one with sandy soil, one with rocky soil, one with clay-rich soil, and one with average soil. She divides each of the four plots into three equal-sized portions and randomly labels them A, B, and C. The four A portions of land are treated with her old fertilizer. The four B portions are treated with the new fertilizer, and the four C's are treated with no fertilizer. At harvest time, the potato yield is recorded for each section of land. What is the response variable in this experiment?

    A) the four types of soil

    B) the section of land (A, B, or C)

    C) the type of fertilizer (old, new, or none)

    D) the potato yield recorded for each section of land

88) _____

Answer: D

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

89) A study was conducted to determine if listening to heavy metal music affects critical   89) _____
thinking. To test the claim, 120 subjects were randomly assigned to two groups. Both
groups were administered a basic math skills exam. The first group took the exam while
heavy metal music was piped into the exam room, while the second group took the exam
in a silent room. The mean exam score for the first group was 82, and the mean exam score
for the second group was 90. The researchers concluded that heavy metal music negatively
affects critical thinking. Identify (a) the research objective, (b) the sample, (c) the
descriptive statistics, and (d) the conclusions made in the study.

Answer: (a) if listening to heavy metal music affects critical thinking
(b) the 120 subjects
(c) the mean exam score for the first group = 82, and the mean exam score for the
second group was 90
(d) that heavy metal music negatively affects critical thinking

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

Determine whether the quantitative variable is discrete or continuous.
90) the age of the oldest employee in the data processing department   90) _____
A) discrete   B) continuous
Answer: B

Provide an appropriate response.
91) A drug company wanted to test a new depression medication. The researchers found 200 adults   91) _____
aged 25-35 and randomly assigned them to two groups. The first group received the new drug,
while the second received a placebo. After one month of treatment, the percentage of each group
whose depression symptoms decreased was recorded and compared. How many levels does the
treatment in this experiment have?
A) 2 (medication or placebo)   B) 10 (age span of respondents)
C) 200 (number of respondents)   D) 1 (months of treatment)
Answer: A

92) A medical journal published the results of an experiment on depression. The experiment   92) _____
investigated the effects of a controversial new therapy for depression. Researchers measured the
depression levels of 83 adult women who suffer moderate conditions of the disorder. After the
therapy, the researchers again measured the women's depression levels. The differences between
the the pre- and post-therapy depression levels were reported. How many levels does the
treatment have in this experiment?
A) 1 (therapy)
B) 166 (the adult women who suffer from depression measured pre- and post-therapy)
C) 83 (the adult women who suffer from depression)
D) 2 (pre- and post-therapy)
Answer: D

93) A farmer wishes to test the effects of a new fertilizer on her corn yield. She has four equal-sized   93) _____
plots of land-- one with sandy soil, one with rocky soil, one with clay-rich soil, and one with
average soil. She divides each of the four plots into three equal-sized portions and randomly labels
them A, B, and C. The four A portions of land are treated with her old fertilizer. The four B portions
are treated with the new fertilizer, and the four C's are treated with no fertilizer. At harvest time,
the corn yield is recorded for each section of land. What type of experimental design is this?
   A) matched-pairs design   B) completely randomized design
   C) double-blind design   D) randomized block design

Answer: D

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

Solve the problem.
94) A pharmaceutical company wants to conduct a survey of 50 individuals who have type 1   94) _____
diabetes. The company has obtained a list from doctors throughout the country of 7400
individuals who are known to have type 1 diabetes. Design a sampling method to obtain
the individuals in the sample.

Answer: Answers will vary. Simple random sampling will work fine here, especially because
a list of 7400 individuals who meet the needs of our study already exists.

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

Determine whether the underlined value is a parameter or a statistic.
95) Telephone interviews of 316 employees of a large electronics company found that 45% were   95) _____
dissatisfied with their working conditions.
   A) parameter   B) statistic

Answer: B

Determine what type of observational study is described. Explain.
96) A researcher wanted to determine whether women with children are more likely to develop   96) _____
anxiety disorders than women without children. She selected a sample of 900 twenty-year old
women and followed them for a twenty-year period. At the start of the study, none of the women
had children. By the end of the study 53% of the women had at least one child. The level of anxiety
of each participant was evaluated at the beginning and at the end of the study and the increase (or
decrease) in anxiety was recorded. The researchers analyzed the results to determine whether there
was an association between anxiety and having children.
   A) case-control; Individuals are asked to look back in time.
   B) cross-sectional; Information is collected at a specific point in time.
   C) cohort; Individuals are observed over a long period of time.

Answer: C

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

Provide an appropriate response.
97) What is statistics?   97) _____

Answer: Statistics is the science of collecting, summarizing, organizing, and analyzing
information in order to answer questions or draw conclusions.

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

Determine the level of measurement of the variable.

98) category of storm (gale, hurricane, etc.)   98) _____
    A) nominal   B) ratio   C) ordinal   D) interval

Answer: C

99) height of a tree   99) _____
    A) nominal   B) interval   C) ordinal   D) ratio

Answer: D

Provide an appropriate response.

100) An experiment in which the experimental unit (or subject) does not know which treatment he or   100) _____
she is receiving is called a _____ .
    A) randomized block design   B) single-blind experiment
    C) double-blind experiment   D) matched-pairs design

Answer: B

101) A researcher wants to study the effects of advertising of accessible online college upon high school   101) _____
boys and sampled small Midwestern towns. The results from this study were used to project a
national campaign on accessible forms of online college. What type or error may have occurred?
    A) Nonsampling error   B) Data-entry error
    C) Question error   D) Sampling error

Answer: D

102) Quantitative variables classify individuals in a sample according to   102) _____
    A) numerical measure.   B) exhibited trait.
    C) personality characteristic.   D) physical attribute.

Answer: A

Determine the level of measurement of the variable.

103) the musical instrument played by a music student   103) _____
    A) interval   B) ordinal   C) ratio   D) nominal

Answer: D

Determine what type of observational study is described. Explain.

104) Researchers wanted to determine whether there was an association between city driving and   104) _____
stomach ulcers. They selected a sample of 900 young adults and followed them for a twenty-year
period. At the start of the study none of the participants was suffering from a stomach ulcer. Each
person kept track of the number of hours per week they spent driving in city traffic. At the end of
the study each participant underwent tests to determine whether they were suffering from a
stomach ulcer. The researchers analyzed the results to determine whether there was an association
between city driving and stomach ulcers.
    A) case-control; Individuals are asked to look back in time.
    B) cohort; Individuals are observed over a long period of time.
    C) cross-sectional; Information is collected at a specific point in time.

Answer: B

Determine the level of measurement of the variable.

105) weight capacity of a backpack

    A) ordinal   B) ratio   C) interval   D) nominal

105) _____

Answer: B

Classify the variable as qualitative or quantitative.

106) the number of calls received at a company's help desk

    A) qualitative   B) quantitative

106) _____

Answer: B

Determine whether the quantitative variable is discrete or continuous.

107) the number of goals scored in a hockey game

    A) continuous   B) discrete

107) _____

Answer: B

Provide an appropriate response.

108) A recent study attempted to estimate the proportion of Florida residents who were willing to spend more tax dollars on protecting the Florida beaches from environmental disasters. Twenty-one hundred Florida residents were surveyed. Which of the following is the population used in the study?

    A) the 2,100 Florida residents surveyed

    B) all Florida residents

    C) the Florida residents who were willing to spend more tax dollars on protecting the beaches from environmental disasters

    D) all Florida residents who lived along the beaches

108) _____

Answer: B

109) The United States can be divided into four geographical regions: Northeast, South, Midwest, and West. The Northeast region consists of 9 states; the South region consists of 16 states; the Midwest consists of 12 states; and the West consists of 13 states. If a survey is to be administered to the governors of 12 of the states and we want equal representation for the states in each of the four regions, how many states from the South should be selected? Round to the nearest whole state.

    A) 4   B) 5   C) 2   D) 3

109) _____

Answer: D

Determine the level of measurement of the variable.

110) a student's favorite sport

    A) ratio   B) ordinal   C) nominal   D) interval

110) _____

Answer: C

Provide an appropriate response.

111) The peak shopping time at a pet store is between 8-11:00 am on Saturday mornings. Management at the pet store randomly selected 100 customers last Saturday morning and decided to observe their shopping habits. They recorded the number of items that a sample of the customers purchased as well as the total time the customers spent in the store. Identify the types of variables recorded by the pet store.

    A) number of items - continuous; total time - continuous

    B) number of items - discrete; total time - discrete

    C) number of items - continuous; total time - discrete

    D) number of items - discrete; total time - continuous

111) _____

Answer: D

Determine whether the study depicts an observational study or an experiment.

112) A poll is conducted in which professional musicians are asked their ages. 112) _____
  A) experiment   B) observational study

  Answer: B

Determine whether the underlined value is a parameter or a statistic.

113) 23.2% of the mayors of cities in an entire certain state are from minority groups. 113) _____
  A) statistic   B) parameter

  Answer: B

Provide an appropriate response.

114) A salesman boasts to a farmer that his new fertilizer will increase the yield of the farmer's crops by 114) _____
15%. The farmer wishes to test the effects of the new fertilizer on her corn yield. She has four equal
sized plots of land—one with sandy soil, one with rocky soil, one with clay-rich soil, and one with
average soil. She divides each of the four plots into three equal sized portions and randomly labels
them A, B and C. The four A portions are treated with her old fertilizer. The four B portions are
treated with the new fertilizer. The four C portions receive no fertilizer. At harvest time, the corn
yield is recorded for each section of land. What is the claim she is testing?
  A) The new fertilizer yielded at least a 15% improvement.
  B) The average soil field had at least a 15% increase in yield.
  C) The A sections had at least a 15% increase in yield.
  D) The total yield increased at least 15%.

  Answer: A

Determine whether the quantitative variable is discrete or continuous.

115) the number of pills in an aspirin bottle 115) _____
  A) continuous   B) discrete

  Answer: B

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

Provide an appropriate response.

116) A telephone poll asked 1,122 registered voters "Would you vote for the current vice 116) _____
president if he ran for president?" Of these 1,122 respondents, 37% would vote for the
current vice president if he ran for president. The administrators of the study concluded
that 37% of all registered voters would vote for the current vice president if he ran for
president. Identify (a) the research objective, (b) the sample, (c) the descriptive statistics,
and (d) the conclusions made in the study.

  Answer: (a) to determine the percentage of registered voters who would vote for the current
        vice president if he ran for president
        (b) the 1,122 registered voters surveyed
        (c) 37% of the respondents supported reelection
        (d) that 37% of all registered voters would vote for the current vice president if he
        ran for president

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

Determine whether the quantitative variable is discrete or continuous.

117) the cholesterol levels of a group of adults the day after Thanksgiving 117) _____
  A) continuous   B) discrete

  Answer: A

Provide an appropriate response.

118) A farmer wishes to test the effects of a new fertilizer on her tomato yield. She has four equal-sized plots of land-- one with sandy soil, one with rocky soil, one with clay-rich soil, and one with average soil. She divides each of the four plots into three equal-sized portions and randomly labels them A, B, and C. The four A portions of land are treated with her old fertilizer. The four B portions are treated with the new fertilizer, and the four C's are treated with no fertilizer. At harvest time, the tomato yield is recorded for each section of land. How many levels does the treatment have in this experiment?

118) _____

   A) 3 (old, new, or no fertilizer)   B) 4 (rocky, sandy, clay, or average soil)
   C) 1 (tomato yield)   D) 12 (sections of land)

Answer: A

Identify the type of sampling used.

119) The names of 80 employees are written on 80 cards. The cards are placed in a bag, and three names are picked from the bag. What sampling technique was used?

119) _____

   A) cluster
   B) simple random
   C) systematic
   D) stratified
   E) convenience

Answer: B

Provide an appropriate response.

120) Which of the following is not true about factors?

120) _____

   A) Factors whose effect on the response variable interests us should be set at predetermined levels.
   B) One way to control factors is to fix their level at one predetermined value throughout the experiment.
   C) Any combination of the values of the factors is called a treatment.
   D) Factors whose effect on the response variable is not of interest can be set after the experiment.

Answer: D

Determine the level of measurement of the variable.

121) weight of rice bought by a customer

121) _____

   A) ratio   B) ordinal   C) nominal   D) interval

Answer: A

Identify the type of sampling used.

122) A lobbyist for the oil industry assigns a number to each senator and then uses a computer to randomly generate ten numbers. The lobbyist contacts the senators corresponding to these numbers. What sampling technique was used?

122) _____

   A) convenience
   B) simple random
   C) stratified
   D) cluster
   E) systematic

Answer: B

123) Every fifth adult entering an airport is checked for extra security screening. What sampling technique is used?

   A) cluster
   B) stratified
   C) convenience
   D) simple random
   E) systematic

123) _____

Answer: E

Provide an appropriate response.

124) The government of a town needs to determine if the city's residents will support the construction of a new town hall. The government decides to conduct a survey of a sample of the city's residents. Which one of the following procedures would be least appropriate for obtaining a sample of the town's residents?

   A) Survey a random sample of persons within each geographic region of the city.
   B) Survey the first 300 people listed in the town's telephone directory.
   C) Survey every 8th person who walks into city hall on a given day.
   D) Survey a random sample of employees at the old city hall.

124) _____

Answer: B

1) A designed experiment is a controlled study in which treatments are applied to experimental units, and the effect of varying these treatments on a response variable is observed.
2) C
3) A
4) A
5) D
6) B
7) A
8) B
9) population: collection of all American households; sample: collection of 1,805 American households surveyed; individuals: each household
10) A
11) C
12) A
13) B
14) C
15) C
16) C
17) B
18) B
19) A
20) A
21) C
22) B
23) Sampling bias; the customers are not chosen through a random sample.
24) E
25) population: collection of all American households; sample: collection of 1,242 American households surveyed; individuals: each household
26) C
27) C
28) A
29) D
30) A
31) C
32) A
33) A
34) D
35) A
36) A
37) D
38) C
39) B
40) B
41) A
42) E
43) A
44) Response bias; poorly worded question
45) B

46) The population of interest is the student loan debt incurred by all graduates of the university. The sample is student loan debt of the 260 graduating seniors that were collected by the university administrators. The individuals are each graduating senior whose student loan debt was recorded.

47) B

48) A

49) E

50) A factor is the variable whose effect on the response variable is to be assessed by the experimenter.

51) B

52) B

53) C

54) C

55) A

56) C

57) C

58) Answers will vary. One option would be stratified sampling. Since this is a national issue, different geographical locations are likely to have similar views.

59) C

60) A

61) C

62) C

63) A

64) A

65) A

66) C

67) A

68) A

69) A

70) A

71) A

72) B

73) B

74) D

75) D

76) B

77) E

78) B

79) B

80) B

81) B

82) D

83) A

84) A

85) Nonresponse bias

86) C

87) A

88) D

89) (a) if listening to heavy metal music affects critical thinking
(b) the 120 subjects
(c) the mean exam score for the first group = 82, and the mean exam score for the second group was 90
(d) that heavy metal music negatively affects critical thinking

90) B
91) A
92) D
93) D
94) Answers will vary. Simple random sampling will work fine here, especially because a list of 7400 individuals who meet the needs of our study already exists.
95) B
96) C
97) Statistics is the science of collecting, summarizing, organizing, and analyzing information in order to answer questions or draw conclusions.
98) C
99) D
100) B
101) D
102) A
103) D
104) B
105) B
106) B
107) B
108) B
109) D
110) C
111) D
112) B
113) B
114) A
115) B
116) (a) to determine the percentage of registered voters who would vote for the current vice president if he ran for president
(b) the 1,122 registered voters surveyed
(c) 37% of the respondents supported reelection
(d) that 37% of all registered voters would vote for the current vice president if he ran for president
117) A
118) A
119) B
120) D
121) A
122) B
123) E
124) B