Exam

Name_____

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

Solve the problem.

1) In a sample of 775 senior citizens, approximately 67% said that they had seen a television commercial for life insurance. About how many senior citizens is this? 1) _____

A) Not enough information available. B) 519
C) 67 D) 256

Answer: B

2) A two-way table could be used for which of the following pairs of variables? 2) _____

A) Gender and age B) Age and favorite class
C) Gender and favorite class D) Age and height

Answer: C

Indicate whether the study described is an observational study or a controlled experiment.

3) "People with diabetes are at higher risk for certain cancers than those without the blood sugar disease, suggests a new study based on a telephone survey of nearly 400,000 adults." 3) _____

A) Controlled experiment B) Observational study

Answer: B

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

Answer the question.

4) The number of clinically obese men in State A is 156,261 and the number of clinically obese men in State B is 294,269. Someone makes the claim that this is evidence that men exercise more in State A. What information is missing that might contradict this claim? 4) _____

Answer: We need to know the total number of men in State A and State B so that a comparison can be made of the percentage of the men in each state that are clinically obese. There could be a much higher male population in State B than State A. Also, assumptions about exercise and obesity are being made.

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

Use the data in Table 1A to answer the question.

The data in Table 1A were collected from one of the authors' statistics classes. The first row gives the variable, and each of the other rows represents a student in the class.

Female	Commute Distance (Miles)	Hair Color	Ring Size	Height (inches)	Number of Aunts	College Units Acquired	Living Situation
0	0	Brown	9.5	71	5	35	Dorm
0	0	Black	8	66	0	20	Dorm
1	0	Brown	7.5	63	3	0	Dorm
0	14	Brown	10	65	2	30	Commuter
1	17	Brown	6	70	1	15	Commuter
1	0	Blonde	5.5	60	0	12	Dorm
0	0	Black	12	76	4	42	Dorm
1	0	Brown	5	70	7	18	Dorm
1	21	Brown	8	64	2	16	Commuter
0	13	Brown	7.5	63	4	40	Commuter
1	0	Brown	8.5	61.5	3	44	Dorm

▲TABLE 1A

Note: 1 is female, 0 is male.

5) Suppose you wanted to know whether the student's commute distance was associated with the student's living situation. Using the data table if possible, which variables would you use? 5) _____

A) Use Commute Distance (Miles) and Living Situation.
B) Data on student's living situation are not included in this study.
C) Use Commute Distance (Miles) and College Units Acquired.
D) Use College Units Acquired and Living Situation.

Answer: A

In a study of 1350 elementary school children, 118 out of the 615 girls in the study said they want to be a teacher when they grow up.

6) What percent of girls want to be a teacher when they grow up? 6) _____

A) 45.6% B) 80.8% C) 8.7% D) 19.2%

Answer: D

Determine if the following scenario is an observational study or a controlled experiment.

7) A doctor is interested in determining whether a certain medication increases the risk of high blood pressure. He randomly selects 100 people for his study - 50 who will take the medication, and 50 who will take a placebo. He checks the patients' blood pressures weekly for six months. 7) _____

A) Observational study B) Neither C) Controlled experiment

Answer: C

Solve the problem.

8) The number of parents who attended parent teacher conferences at a local elementary school is an example of what type of variable? 8) _____

A) Numerical variable B) Categorical variable C) Neither

Answer: A

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

Determine if the following scenario is an observational study or a controlled experiment and explain your reasoning.

9) A doctor is interested in determining whether a certain medication is effective at treating abdominal pain. He reviews his patients' medical records and finds that a higher proportion of people who took the medication fewer abdominal pain symptoms than those who did not take the medication. 9) _____

Answer: This is an observational study because the doctor did not randomly assign patients into groups. Instead, he simply looked at medical files.

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

Solve the problem.

10) A two-way table is useful for describing which types of variables? 10) _____

A) One numerical variable.
B) Two categorical variables.
C) One numerical variable and one categorical variable.
D) Two numerical variables.

Answer: B

11) The following data table is organized using which method? 11) _____

Gender	Age
Male	35
Female	42
Female	33
Male	37
Female	39

A) This is stacked data because each row represents one person.
B) This is unstacked data because the ages are separated by groups (in this case, gender).
C) This is stacked data because the ages are separated by groups (in this case, gender).
D) This is unstacked data because each row represents one person.

Answer: A

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

12) According to the following two-way table, why are percentages more useful than counts to compare the amount of males and females who eat breakfast? 12) _____

	Male	Female
Eat breakfast	35	40
Skips breakfast	20	5

Answer: The group sizes are different. There are 55 males, but only 45 females.

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

13) A bicycle manufacturer produces four different bicycle models. Information is summarized in the table below: 13) _____

Model	Series Number	Weight	Style
Ascension	A120	31	Mountain
Road Runner	B640	19	Road
All Terrain	C300	27	Hybrid
Class Above	D90	15	Racing

Identify the variables and determine whether each variable is numerical or categorical.

A) series number: numerical; weight: categorical; style: categorical
B) series number: categorical; weight: numerical; style: categorical
C) series number: categorical; weight: categorical; style: categorical
D) series number: numerical; weight: numerical; style: categorical

Answer: B

A data set on Shark Attacks Worldwide posted on StatCrunch records data on all shark attacks in recorded history including attacks before 1800. Variables contained in the data include time of attack, date, location, activity the victim was engaged in when attacked, type of injuries sustained by the victim, whether or not the injury was fatal, and species of shark. Which of the following questions could not be answered using this data set?
(Source: www.sharkattackfile.net)

14) Using the data described , if possible, which variable would you use to determine if shark attacks happen more often to men than women? 14) _____

A) Use Activity of the Victim
B) Use Species of Shark.
C) Use Type of Injury.
D) Data on gender of the victim are not included in the table.

Answer: D

Solve the problem.

15) Consider the following statement, "Babies who breastfeed are less likely to grow into children with behavioral problems by the time they reach age 5 than those who receive formula milk." Which of the following is a plausible confounding variable in this study? 15) _____

A) Mother's social-economic status
B) The age at which breastfeeding ends
C) The quality of the formula milk
D) All of these
E) None of these

Answer: D

Determine if the following scenario is an observational study or a controlled experiment.

16) A doctor is interested in determining whether a certain medication reduces migraines. She randomly selects 100 people for his study - 50 who will take the medication, and 50 who will take a placebo. The patients are examined once a week for six weeks. 16) _____

A) Controlled experiment B) Neither C) Observational study

Answer: A

Solve the problem.

17) A gym is offering a new 6-week diet plan for its members. Members who sign up for the program are weighed and measured once a week for the duration of the program. The owners of the gym want to know if the diet plan actually helps people lose weight. What variable could be a possible confounding factor in determining the cause of weight loss? 17) _____

A) The person's exercise routine. B) The person's education level.
C) The person's marital status. D) The person's social life.

Answer: A

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

18) Give an example of one categorical variable and one numerical variable. 18) _____

Answer: Answers will vary. Examples might include: categorical - gender, favorite candy, year in school, favorite color, etc.; numerical - age, height, weight, speed, etc.

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

19) Determine which of the following five variables are numerical and which are categorical. 19) _____
age, gender, height, favorite candy, eye color

A) All of the variables are categorical.
B) All of the variables are numerical.
C) Age and height are numerical variables. Gender, favorite candy, and eye color are categorical variables.
D) Age, height, and favorite candy are numerical variables. Gender and ethnicity are categorical variables.

Answer: C

A group of 500 patients who suffer from hypothyroidism, a condition in which your thyroid does not produce enough of certain hormones, were asked to participate in a study to determine the effectiveness of a new medication. The patients were randomly divided into two groups, one that was given the actual medication, and one that received a placebo pill. The results of the study are below.

	Medication	Placebo
Symptoms improved	205	140
Symptoms did not improve	65	90

20) Can we conclude that the improved symptoms were caused by the new medication? 20) _____

A) No, even though this is a controlled experiment, there might be a confounding factor since the placebo group had improved symptoms too.
B) Yes, this is a controlled experiment. We can always conclude causation with a controlled experiment.
C) No, even though this is a controlled experiment, there was no difference between the treatment and control groups, so we cannot conclude causation.
D) Yes, this is a controlled experiment. Since a higher percent of patients who took the medication had improved symptoms, we can conclude causation.

Answer: D

21) What percent of patients who took the medication had improved symptoms? 21) _____

A) 41% B) 54% C) 75.9% D) 65.2%

Answer: C

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

Solve the problem.

22) What is the difference between a blind and a double blind study? Which is most ideal? 22) _____

Answer: In a blind study, the participants do not know which group they have been assigned to. For example, in a medical experiment, the patients do not know if they are receiving actual medication or just a placebo. In a double blind study, neither the researchers, nor the participants know which group the participants have been assigned to. A double blind study is better than a blind study.

Answer the question.

23) Give an example of how data could be collected about you on a daily basis. 23) _____

Answer: Answers will vary. Examples might include: Facebook postings, Twitter tweets, Instagram photos, emails sent/received, credit/debit card swipes, GPS, text messaging, etc.

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

Provide an appropriate response.

24) Consider the following statement "My child was bullied on the school bus and so was my neighbor's child, so obviously, bullying is a big problem on school buses and something needs to be done about it!" What is wrong with this statement? 24) _____

A) The statement is anecdotal.
B) The statement exhibits bias.
C) The person making the statement confused correlation with causation.
D) None of these--the statement is valid.

Answer: A

Use the data in Table 1A to answer the question.

The data in Table 1A were collected from one of the authors' statistics classes. The first row gives the variable, and each of the other rows represents a student in the class.

Female	Commute Distance (Miles)	Hair Color	Ring Size	Height (inches)	Number of Aunts	College Units Acquired	Living Situation
0	0	Brown	9.5	71	5	35	Dorm
0	0	Black	8	66	0	20	Dorm
1	0	Brown	7.5	63	3	0	Dorm
0	14	Brown	10	65	2	30	Commuter
1	17	Brown	6	70	1	15	Commuter
1	0	Blonde	5.5	60	0	12	Dorm
0	0	Black	12	76	4	42	Dorm
1	0	Brown	5	70	7	18	Dorm
1	21	Brown	8	64	2	16	Commuter
0	13	Brown	7.5	63	4	40	Commuter
1	0	Brown	8.5	61.5	3	44	Dorm

▲ TABLE 1A

Note: 1 is female, 0 is male.

25) Suppose you wanted to know whether the student's height was associated with the student's weight. Using the data table, if possible, which variables would you use? 25) _____

A) Use Weight and Ring Size.
B) Data on student's weight are not included in this study.
C) Use Female and Height.
D) Use Height and Weight.

Answer: B

Solve the problem.

26) An international relations professor is supervising four master's students. Information about the students is summarized in the table. 26) _____

Student Name	Student Number	Area of Interest	GPA
Anna	914589205	Africa	3.40
Pierre	981672635	Middle East	3.87
Juan	906539012	Latin America	3.75
Yoko	977530271	Asia	3.13

Identify the variables and determine whether each variable is numerical or categorical.

A) student number: numerical; area of interest: categorical; GPA: numerical
B) student number: categorical; area of interest: categorical; GPA: numerical
C) student number: numerical; area of interest: categorical; GPA: categorical
D) student number: categorical; area of interest: categorical; GPA: categorical

Answer: B

27) In a survey, high school graduates were asked "Did you play sports in high school?" The response was electronically recorded as a "1" for yes and a "0" for no. This is an example of _____. 27) _____

A) Random sample
B) Coded categorical data
C) Unstacked numerical data
D) None of these

Answer: B

Indicate whether the study described is an observational study or a controlled experiment.

28) A group of students is divided into two groups. One group listens to classical music while taking a math test and the other group takes the test in silence. The average test scores of the two groups are compared to see whether listening to music during a math test has an effect on scores. 28) _____

A) Observational study B) Controlled experiment

Answer: B

Solve the problem.

29) Researchers conducted a study and determined that students who carpool have less friends than students who ride the bus to school. Can we conclude that carpooling causes students to have less friends? 29) _____

A) No, this is an observational study and we cannot conclude causation.
B) No, this is an experiment and we cannot conclude causation.
C) Yes, this is an experiment and we can conclude causation.
D) Yes, this is an observational study and we can conclude causation.

Answer: A

30) Researchers conducted an experiment to determine if riding a bike to school improves attention span. What are the treatment and outcome variables? 30) _____

A) The treatment variable is attention span. The outcome variable is whether or not the child rode a bike to school.
B) The treatment variable is attention span. The outcome variable is the child's attention span score.
C) The treatment variable is riding a bike to school. The outcome variable is the child's attention span.
D) The treatment variable is riding a bike to school. The outcome variable is whether or not the child rode a bike to school.

Answer: C

31) What does it mean for an experiment to be double-blinded? 31) _____

A) The researcher does not know which participants are in the treatment and control groups.
B) The researcher and the participants know which group they are in because it is unethical to keep this information from them.
C) The participants do not know who is in the treatment and control groups.
D) Neither the researcher nor the participants know who is in the treatment and control groups.

Answer: D

In a study of 900 adults, 45 out of the 325 men in the study said that they preferred to rent a movie on DVD rather than going out to a movie theater.

32) What is the approximate percentage of men in this study who prefer to rent a movie on DVD? 32) _____

A) 36% B) 13.8% C) 5%

Answer: B

A group of 500 patients who suffer from hypothyroidism, a condition in which your thyroid does not produce enough of certain hormones, were asked to participate in a study to determine the effectiveness of a new medication. The patients were randomly divided into two groups, one that was given the actual medication, and one that received a placebo pill. The results of the study are below.

	Medication	Placebo
Symptoms improved	205	140
Symptoms did not improve	65	90

33) Was the new medication effective in treating hypothyroidism? 33) _____

A) No, this was not a controlled experiment.
B) Yes, both groups had more patients with improved symptoms.
C) No, the patients who took the placebo also had improved symptoms.
D) Yes, a higher percent of patients who took the medication had improved symptoms than the patients who took the placebo.

Answer: D

Solve the problem.

34) According to the following two-way table, what percent of people in the sample prefer dogs? 34) _____

	Male	Female
Dog	40	25
Cat	25	10

A) 25% B) 40% C) 35% D) 65%

Answer: D

35) According to the following data table, which variable(s) is(are) categorical? 35) _____

Age	Gender	Shoe Size	Ethnicity
18	1	10	1
23	0	7	0
21	0	6	2
19	1	11	1
20	1	10	3

A) Gender and ethnicity
B) None are categorical because there are only numbers in the table
C) Gender, shoe size, and ethnicity
D) Gender

Answer: A

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

In a recent study of 1200 adult smokers, 125 out of the 560 males in the study said they were interested in joining a help group to quit smoking.

36) What percent of males are interested in joining this group? 36) _____

Answer: $\frac{125}{560} = 0.223 = 22.3\%$

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

Solve the problem.

37) The ethnicity of the individual respondents in a political poll of a randomly selected group of adults is an example of what type of variable? 37) _____

A) Numerical variable B) Categorical variable C) Neither

Answer: B

In a study of 900 adults, 45 out of the 325 men in the study said that they preferred to rent a movie on DVD rather than going out to a movie theater.

38) What is the approximate percentage of women who participated in this study? 38) _____

A) 63.9% B) Not enough information available

C) 41% D) 7.8%

Answer: A

Solve the problem.

39) The average number of hours spent completing statistics homework for a randomly selected group of statistics students is an example of what type of variable? 39) _____

A) Numerical variable B) Categorical variable C) Neither

Answer: A

40) The average gas mileage of the top selling mini-vans for each U. S. car manufacturer is an example of what type of variable? 40) _____

A) Categorical variable B) Numerical variable C) Neither

Answer: B

In a study of 1350 elementary school children, 118 out of the 615 girls in the study said they want to be a teacher when they grow up.

41) What percent of the study's participants were boys? 41) _____

A) 83.7% B) 19.2% C) 54.4% D) 45.6%

Answer: C

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

Answer the question.

42) In a study at one university, it has been recorded that Model 1 smart phone screens were brought to a shop to be repaired 5,876 times in one year . Model 2 smart phone screens were brought into the same shop to be repaired only 702 times that year. Can we conclude that Model 1 smart phones screens are more fragile than Model 2 smart phone screens? If you answered no, what additional data would allow us to make a conclusion about which type of smart phone screen is more fragile? 42) _____

Answer: It cannot be conclude that Model 1 smart phones screens are more fragile than Model 2 smart phone screens . We need to know the percentage of each type of smart phone model brought into the store for screen repairs. To find this percentage, the number of each type of smart phone models that are in the population is required. Model 1 smart phones could be a lot more popular than Model 2 smart phones, for instance.

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

Solve the problem.

43) Coconut oil has become quite popular in recent years. People who use coconut oil claim it helps with hair care, skin care, stress relief, weight loss, and a boosted immune system. Can we conclude that the use of coconut oil causes these health benefits? 43) _____

A) Yes, the claims are true stories, so we do have evidence of the health benefits.
B) Yes, the claims are anecdotes and give us a good comparison group to find health differences.
C) No, the claims are anecdotes and do not give us a true comparison group to find health differences.
D) No, the claims are lies, so we do not have evidence of the health benefits.

Answer: C

44) According to the following two-way table, why are percentages more useful than counts to compare the amount of males and females who take naps? 44) _____

	Male	Female
Naps	25	30
Does not nap	35	10

A) You should only use counts in a two-way table.
B) You should only use percentages in a two-way table.
C) There are more males than females in the sample.
D) There are more people who take naps than people who do not in the sample.

Answer: C

45) Marital status of each member of a randomly selected group of adults is an example of what type of variable? 45) _____

A) Numerical variable B) Categorical variable C) Neither

Answer: B

46) Researchers conducted a study and determined that students who participate in sports are happier than students who do not. Can we conclude that participating in sports makes students happier? 46) _____

A) No, this is an observational study and we cannot conclude causation.
B) Yes, this is an observational study and we can conclude causation.
C) No, this is an experiment and we cannot conclude causation.
D) Yes, this is an experiment and we can conclude causation.

Answer: A

47) In Los Angeles, juice cleansing is very popular. Some people have claimed that the cleanses are beneficial for weight loss, body detoxification, and treatment and prevention of illnesses. Can we conclude that juice cleansing causes these health benefits? 47) _____

A) No, the claims are anecdotes and do not give us a true comparison group to find health differences.
B) Yes, the claims are anecdotes and give us a good comparison group to find health differences.
C) Yes, the claims are true stories, so we do have evidence of the health benefits.
D) No, the claims are lies, so we do not have evidence of the health benefits.

Answer: A

Indicate whether the study described is an observational study or a controlled experiment.

48) The obesity rates of elementary age children living in urban areas are compared to those living in rural areas to see whether children in urban settings have higher obesity rates. 48) _____

A) Observational study B) Controlled experiment

Answer: A

A data set on Shark Attacks Worldwide posted on StatCrunch records data on all shark attacks in recorded history including attacks before 1800. Variables contained in the data include time of attack, date, location, activity the victim was engaged in when attacked, type of injuries sustained by the victim, whether or not the injury was fatal, and species of shark. Which of the following questions could not be answered using this data set?
(Source: www.sharkattackfile.net)

49) Using the data described, if possible, which variable(s) would you use to determine in which year the least number of shark attacks occurred? 49) _____

A) Use Hair Color and Number of Aunts.
B) Use Location.
C) Use Date.
D) Data on the year are not included in the table.

Answer: C

Solve the problem.

50) In a survey, married couples were asked, "Do you have children?" The response was electronically recorded as a "1" for yes and a "0" for no. This is an example of _____. 50) _____

A) Random sample B) Coded categorical data
C) Unstacked numerical data D) None of these

Answer: B

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

51) According to the following two-way table, what percent of people in the sample eat breakfast? 51) _____

	Male	Female
Eat breakfast	35	40
Skips breakfast	20	5

Answer: $\frac{75}{100} = 0.75 = 75\%$

52) Researchers conducted a study and determined that coworkers who socialize outside of work are more productive than coworkers who do not. Can we conclude that socializing outside of work causes coworkers to be more productive? Explain your reasoning. 52) _____

Answer: No, this is an observational study and we cannot conclude causation.

53) A college is offering a new free tutoring program for students in an introductory statistics class. The school wants to know if this new program improves students' test scores on their midterms and final exams. What variable could be a possible confounding factor in determining why students' scores improved or not? 53) _____

Answer: Answers will vary. Examples might include: a student's access to other help/tutoring programs, a student's major on campus (e.g. a mathematics major versus a history major), a student's study skills prior to the program, etc.

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

In a study of 1050 adults, 175 out of the 650 women in the study said that they preferred to drive an SUV to driving a compact car.

54) What is the approximate percentage of study participants who are women? 54) _____

A) 16.7%
B) 26.9%
C) 61.9%
D) Not enough information available

Answer: C

Solve the problem.

55) The following data table is organized using which method? 55) _____

Men's Ages	Women's Ages
35	42
39	33
41	37
37	35
40	39

A) This is unstacked data because the ages are separated by groups (in this case, gender).
B) This is unstacked data because each row represents one person.
C) This is stacked data because each row represents one person.
D) This is stacked data because the ages are separated by groups (in this case, gender).

Answer: A

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

A group of 500 patients who suffer from severe migraines were asked to participate in a study to determine the effectiveness of a new medication. The patients were randomly divided into two groups, one that was given the actual medication, and one that received a placebo pill. A good outcome was defined as a reduction in the number of migraines during a month's time. The results of the study are below.

	Medication	Placebo
Migraines reduced	185	70
Migraines did not reduce	90	155

56) Was the new medication effective for reducing migraines? Explain your reasoning and include any calculations. 56) _____

Answer: Yes, a higher percent of patients who took the medication had fewer migraines $\left(\frac{185}{275} = 67.3\%\right)$ than the patients who took the placebo $\left(\frac{70}{275} = 31.1\%\right)$

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

The two-way table below shows the survey results when sixty adults were asked whether they had made a clothing purchase in the last thirty days.

	Male	Female
Purchased clothing in the last thirty days.	10	29
Had not purchased clothing in the last thirty days.	10	11

57) What percentage of the sample had not made a clothing purchase in the past thirty days? 57) _____
A) 33% B) 65% C) 35% D) 50%

Answer: C

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

Solve the problem.

58) Give an example of how anecdotal evidence can be used to persuade consumers to purchase a product. 58) _____

Answer: Answers will vary. Examples might include: (1) a pregnancy blog references a few individual women's experiences with cocoa butter lotion and its reduction of stretch marks, (2) a local health store includes quotes from 5 customers on an advertisement that claims coconut oil consumption can reduce stress and improve health, (3) a commercial for skincare products interviews a small group of people that claim the product has cured their acne, etc.

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

The two-way table below shows teenage driver gender and whether or not the respondent had texted at least once while driving during the last thirty days.

	Teenage driver-Male	Teenage driver-Female
Texted at least once while driving during past 30 days.	5	7
Had not texted at least once while driving during the past 30 days.	11	9

59) What percentage of the sample had texted at least once while driving in the past thirty days? 59) _____
A) 37.5% B) 50% C) 43.75% D) 62.5%

Answer: A

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

Answer the question.

60) Only two cafeterias are available at a large university. The first offers vegetarian food and the second offers only non-vegetarian meals. The vegetarian cafeteria serves 30 students on a given Friday, while the non-vegetarian cafeteria serves 15 lunches on that same Friday. A student claims that this is evidence that students who were on campus on that Friday preferred vegetarian food. What information is missing that might contradict this claim? 60) _____

Answer: It is not known the percentage of the student body in the two cafeterias on Friday. The larger number of students eating at the first cafeteria on Friday could be because the first cafeteria has a larger capacity than the second cafeteria or that it is closer to campus.
An alternate possibility could be that we don't know the number of students on campus that Friday. Quite possibly the university has more than 45 students, and we don't know what the rest of them ate. (Presumably they went off campus or brought their own food.)

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

Answer the question.

61) Data can be defined as numbers in context. Suppose you are given the following set of numbers: 61) _____
1.73, 1.83, 1.57, 1.88, 1.70, 1.65
What additional information would allow you to define these numbers as data?
A) Units of measurement. This could represent the heights of six 5-year-olds, in meters.
B) We need to know who collected these numbers.
C) We need to know where these numbers were collected.
D) Units of measurement. This could represent the heights of six 20-year-olds, in meters.

Answer: D

Indicate whether the study described is an observational study or a controlled experiment.

62) A group of cancer patients is divided into two groups. One group is given a new drug to fight the side effects of chemotherapy and the other group is given a placebo. After three months they are asked to respond to a questionnaire about the frequency and severity of their side effects to see whether the new drug improved the overall negative side effects of chemotherapy. 62) _____
A) Observational study B) Controlled experiment

Answer: B

Solve the problem.

63) According to the following data table, which variable(s) is(are) categorical? 63) _____

Age	Gender	Weight	Ethnicity
23	1	180	1
18	0	126	0
20	0	139	2
19	1	154	1
20	1	202	3

A) Gender and ethnicity
B) Age, gender, and ethnicity
C) None are categorical because there are only numbers in the table
D) Gender

Answer: A

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

A group of 500 patients who suffer from severe migraines were asked to participate in a study to determine the effectiveness of a new medication. The patients were randomly divided into two groups, one that was given the actual medication, and one that received a placebo pill. A good outcome was defined as a reduction in the number of migraines during a month's time. The results of the study are below.

	Medication	Placebo
Migraines reduced	185	70
Migraines did not reduce	90	155

64) Approximately what percent of patients who took the medication had a reduction in the amount of migraines? 64) _____

Answer: $\frac{185}{185 + 90} = \frac{185}{275} = 0.6727 = 67.3\%$

Solve the problem.

65) Determine whether the following data table is stacked or unstacked and explain your reasoning. 65) _____

Age	School Year
18	Freshman
20	Sophomore
19	Sophomore
21	Junior
21	Senior

Answer: This is stacked data because each row represents one person.

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

The two-way table below shows teenage driver gender and whether or not the respondent had texted at least once while driving during the last thirty days.

	Teenage driver-Male	Teenage driver-Female
Texted at least once while driving during past 30 days.	5	7
Had not texted at least once while driving during the past 30 days.	11	9

66) What percentage of the sample were female drivers? 66) _____

A) 78% B) 28.3% C) 50% D) 62.5%

Answer: C

A group of 500 patients who suffer from skin cancer were asked to participate in a study to determine the effectiveness of a new medication. The patients were randomly divided into two groups, one that was given the actual medication, and one that received a placebo pill. A good outcome was defined as the cancer being in remission after 6 months of treatment. The results of the study are below.

	Medication	Placebo
Remission	160	130
Not in remission	80	130

67) Can we conclude that the cancer remissions were caused by the new medication? 67) _____

A) Yes, this is a controlled experiment. We can always conclude causation with a controlled experiment.

B) No, even though this is a controlled experiment, there was no difference between the treatment and control groups, so we cannot conclude causation.

C) No, even though this is a controlled experiment, there might be a confounding factor since the placebo group had cancer remissions too.

D) Yes, this is a controlled experiment. Since a higher percent of patients who took the medication had cancer remissions, we can conclude causation.

Answer: D

Use the data in Table 1A to answer the question.

The data in Table 1A were collected from one of the authors' statistics classes. The first row gives the variable, and each of the other rows represents a student in the class.

Female	Commute Distance (Miles)	Hair Color	Ring Size	Height (inches)	Number of Aunts	College Units Acquired	Living Situation
0	0	Brown	9.5	71	5	35	Dorm
0	0	Black	8	66	0	20	Dorm
1	0	Brown	7.5	63	3	0	Dorm
0	14	Brown	10	65	2	30	Commuter
1	17	Brown	6	70	1	15	Commuter
1	0	Blonde	5.5	60	0	12	Dorm
0	0	Black	12	76	4	42	Dorm
1	0	Brown	5	70	7	18	Dorm
1	21	Brown	8	64	2	16	Commuter
0	13	Brown	7.5	63	4	40	Commuter
1	0	Brown	8.5	61.5	3	44	Dorm

▲ TABLE 1A

Note: 1 is female, 0 is male.

68) Suppose you wanted to know whether the student's hair color was associated with the shoe size. Using the data table, if possible, which variables would you use? 68) _____

A) Data on Shoe Size are not included in this study.
B) Use Hair Color and Ring Size.
C) Use Hair Color and Living Situation.
D) Use Hair Color and Number of Aunts.

Answer: A

Solve the problem.

69) Determine which of the following five variables are numerical and which are categorical. 69) _____
age, gender, weight, ethnicity, favorite math class

A) All of the variables are categorical.
B) All of the variables are numerical.
C) Age and weight are numerical variables. Gender, ethnicity, and favorite math class are categorical variables.
D) Age, weight, and favorite math class are numerical variables. Gender and ethnicity are categorical variables.

Answer: C

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

Determine if the following scenario is an observational study or a controlled experiment and explain your reasoning.

70) A school teacher is interested in determining whether students who take multiple choice tests do better than students who take true/false tests. She has been giving multiple choice tests since she started teaching and is wondering if she should change her testing method. She randomly assigns half of her students to take a multiple choice test about grammar rules, and the other half to take a true/false test about grammar rules. She compares the test scores of the students in each group. 70) _____

Answer: This is a controlled experiment because the students are randomly assigned to the treatment group (true/false test) and the control group (multiple choice test).

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

A group of 500 patients who suffer from skin cancer were asked to participate in a study to determine the effectiveness of a new medication. The patients were randomly divided into two groups, one that was given the actual medication, and one that received a placebo pill. A good outcome was defined as the cancer being in remission after 6 months of treatment. The results of the study are below.

	Medication	Placebo
Remission	160	130
Not in remission	80	130

71) Was the new medication effective for cancer remission? 71) _____

A) No, this was not a controlled experiment.
B) Yes, both groups had more patients with cancer remissions.
C) No, the patients who took the placebo also had cancer remissions.
D) Yes, a higher percent of patients who took the medication had cancer remissions than the patients who took the placebo.

Answer: D

In a study of 1050 adults, 175 out of the 650 women in the study said that they preferred to drive an SUV to driving a compact car.

72) What is the approximate percentage of study participants who are women in this study who said that they prefer to drive an SUV to driving a compact car? 72) _____

A) 26.9% B) 16.7% C) 61.9%

Answer: A

Solve the problem.

73) According to the following two-way table, why are percentages more useful than counts to compare pet preferences between males and females? 73) _____

	Male	Female
Dog	40	25
Cat	25	10

A) You should only use percentages in a two-way table.
B) You should only use counts in a two-way table.
C) There are more males than females in the sample.
D) There are more people who prefer dogs than cats in the sample.

Answer: C

74) Consider the following statement: "Researchers conducted a large observational study and determined that children who participated in school music programs scored higher on math exams in later grades than those who did not." Suppose that upon hearing this a politician states that all children should participate in school music programs. What is wrong with the politician's statement? 74) _____

A) The controlled experiment was not double-blinded.
B) There was a placebo effect.
C) The politician confused correlation with causation.
D) This study exhibits bias.

Answer: C

Provide an appropriate response.

75) 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 75 back. What is the problem with how the information is gathered? 75) _____

A) The 1000 surveys were not sent to randomly selected households.
B) Only residents from the local area were polled.
C) The only responses were from people who chose to send the survey back.
D) To get a random sample, surveys would have to be mailed to every household.

Answer: C

Use the data in Table 1A to answer the question.

The data in Table 1A were collected from one of the authors' statistics classes. The first row gives the variable, and each of the other rows represents a student in the class.

Female	Commute Distance (Miles)	Hair Color	Ring Size	Height (inches)	Number of Aunts	College Units Acquired	Living Situation
0	0	Brown	9.5	71	5	35	Dorm
0	0	Black	8	66	0	20	Dorm
1	0	Brown	7.5	63	3	0	Dorm
0	14	Brown	10	65	2	30	Commuter
1	17	Brown	6	70	1	15	Commuter
1	0	Blonde	5.5	60	0	12	Dorm
0	0	Black	12	76	4	42	Dorm
1	0	Brown	5	70	7	18	Dorm
1	21	Brown	8	64	2	16	Commuter
0	13	Brown	7.5	63	4	40	Commuter
1	0	Brown	8.5	61.5	3	44	Dorm

▲ TABLE 1A

Note: 1 is female, 0 is male.

76) Suppose you wanted to know whether the men or the women had larger ring sizes. In the Female column of the table, 1 represents Female and 0 stands for Male. Using the data table, if possible, which variables would you use? 76) _____

A) Use Female and Ring Size.
B) Use Height and Ring Size.
C) Data on student's ring size are not included in this study.
D) Use Female and Height.

Answer: A

Solve the problem.

77) A statistics student collected data from other students in her class who ride a bike to school. The following table shows data about their bikes: 77) _____

Color	Series Number	Weight (lbs)	Road Bike	Average Speed (mph)
Black	A120	33	0	16
Blue	B640	22	1	24
Green	C300	26	0	14
Black	D90	15	1	23

How many variables are there?

A) 5 B) 7 C) 20 D) 4

Answer: A

78) What does it mean for an experiment to be random? 78) _____

A) Assignment into the control and treatment groups is determined by the researcher.
B) Assignment into the control and treatment groups is determined by a person who is not involved in the research.
C) Assignment into the control and treatment groups is determined by chance.
D) Assignment into the control and treatment groups is determined by the participants.

Answer: C

79) Researchers conducted an experiment to determine if children who participate in a new after-school tutoring program do better on state-mandated tests than children who do not attend the program. What are the treatment and outcome variables? 79) _____

A) The treatment variable is the state-mandated test. The outcome variable is the participation in the after-school program.
B) The treatment variable is participation in the after-school program. The outcome variable is the test score on the state-mandated test.
C) The treatment variable is the state-mandated test. The outcome variable is the test score on the state-mandated test.
D) The treatment variable is participation in the after-school program. The outcome variable is whether or not a child attended.

Answer: B

80) According to the following two-way table, what percent of people in the sample take naps? 80) _____

	Male	Female
Naps	25	30
Does not nap	35	10

A) 55% B) 35% C) 25% D) 60%

Answer: A

A group of 500 patients who suffer from skin cancer were asked to participate in a study to determine the effectiveness of a new medication. The patients were randomly divided into two groups, one that was given the actual medication, and one that received a placebo pill. A good outcome was defined as the cancer being in remission after 6 months of treatment. The results of the study are below.

	Medication	Placebo
Remission	160	130
Not in remission	80	130

81) Approximately what percent of patients who took the medication had cancer remission? 81) _____
A) 67% B) 48% C) 58% D) 50%

Answer: A

Determine if the following scenario is an observational study or a controlled experiment.

82) A doctor is interested in determining whether a certain medication reduces migraines. She reviews her patients' medical records and finds that a higher proportion of people who take the medication have fewer migraines than those who did not take the medication. 82) _____
A) Observational study B) Neither C) Controlled experiment

Answer: A

Solve the problem.

83) The table gives the GPA of some students in two math classes. One class meets in the morning and one in the afternoon. 83) _____

Morning	Afternoon
3.69	3.40
2.97	3.84
3.12	3.81
3.44	3.63

Is the format of the data set stacked or unstacked?
A) stacked B) unstacked

Answer: B

84) Consider the following statement, "In a nationwide study, children on an all-organic diet are more alert in school than those not on an all-organic diet." Which of the following is a plausible confounding variable in this study? 84) _____
A) Parents' social-economic status
B) School start times
C) The quality of the non-organic diet
D) All of these
E) None of these

Answer: D

The two-way table below shows the survey results when sixty adults were asked whether they had made a clothing purchase in the last thirty days.

	Male	Female
Purchased clothing in the last thirty days.	10	29
Had not purchased clothing in the last thirty days.	10	11

85) Of the adult males surveyed, what percentage had made a clothing purchase in the last thirty days? 85) _____
A) 50% B) 35% C) 33% D) 65%
Answer: A

In a study of 1200 adults, 480 out of the 630 women in the study said they attended a state college or university.

86) What percent of women attended a state college or university? 86) _____
A) 47.5% B) 40% C) 76.2% D) 52.5%
Answer: C

Solve the problem.

87) In a recent school poll, the administrators asked if students were satisfied with the school's course offerings. What is the population of interest here? 87) _____
A) All students who participated in the poll.
B) All students who attend the school.
C) All students who are satisfied with the course offerings.
D) All students who are not satisfied with the course offerings.
Answer: B

Indicate whether the study described is an observational study or a controlled experiment.

88) A group of students is divided into two groups. One group is a given a new chewable vitamin and the other group is given a placebo. After six months they are asked to fill out a questionnaire and given a health exam to see whether the new vitamin has health benefits that are better than a placebo. 88) _____
A) Observational study B) Controlled experiment
Answer: B

Answer the question.

89) Data can be defined as numbers in context. Suppose you are given the following set of numbers: 89) _____
18, 22, 22, 20, 19, 21
What additional information would allow you to define these numbers as data?
A) Units of measurement. This could represent the ages of six college students.
B) We need to know who collected these numbers.
C) We need to know where these numbers were collected.
D) Units of measurement. This could represent the ages of six high school students.
Answer: A

Solve the problem.

90) A state senator's comments about the dangers of global warming are an example of what type of variable? 90) _____
A) Numerical variable B) Categorical variable C) Neither
Answer: C

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

A group of 500 patients who suffer from severe migraines were asked to participate in a study to determine the effectiveness of a new medication. The patients were randomly divided into two groups, one that was given the actual medication, and one that received a placebo pill. A good outcome was defined as a reduction in the number of migraines during a month's time. The results of the study are below.

	Medication	Placebo
Migraines reduced	185	70
Migraines did not reduce	90	155

91) Can we conclude that the reduction of migraines was caused by the new medication? Explain your reasoning. 91) _____

Answer: Yes, this is a controlled experiment. Since a higher percent of patients who took the medication had fewer migraines, we can conclude causation.

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

Indicate whether the study described is an observational study or a controlled experiment.

92) The smoking rates of teens in urban areas are compared to those living in rural areas to see whether teens living in rural settings have higher rates of smoking. 92) _____

A) Controlled experiment B) Observational study

Answer: B

Solve the problem.

93) In a recent high school poll, the principal asked if students were satisfied with the amount of after-school activities offered. What is the population of interest here? 93) _____

A) All students who attend the school.
B) All students who are not satisfied with the amount of after-school activities that are offered.
C) All students who are satisfied with the amount of after-school activities that are offered.
D) All students who participated in the poll.

Answer: A

Determine if the following scenario is an observational study or a controlled experiment.

94) A doctor is interested in determining whether a certain medication increases the risk of high blood pressure. He reviews his patients' medical records and finds that a higher proportion of people who take the medication are suffering from high blood pressure. 94) _____

A) Neither B) Controlled experiment C) Observational study

Answer: C

Solve the problem.

95) In a sample of 800 first-year college students, 72% said that they check their Facebook page at least three times a day. How many students is this? 95) _____

A) 72 B) Not enough information available.
C) 224 D) 576

Answer: D

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

96) What types of variables are represented in a two-way table? Give an example. 96) _____

Answer: Two categorical variables. Answers will vary. Examples might include: gender & favorite color, gender & year in school, year in school & favorite animal, etc.

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

Identify the type of sampling used.

97) A recent report showed there were 49 accidents involving pedestrians in City A and 62 accidents involving pedestrians in City B this year. The mayor of City A claims that his city is safer for pedestrians than City B. What information is missing that might contradict this claim? 97) _____

A) The number of accidents involving pedestrians from the previous year
B) The total number of pedestrians in both City A and City B
C) The number of accidents that do not involve pedestrians in both City A and City B
D) The number of crosswalks in both City A and City B

Answer: B

In a study of 1200 adults, 480 out of the 630 women in the study said they attended a state college or university.

98) What percent of the study's participants were women? 98) _____

A) 40% B) 76.2% C) 47.5% D) 52.5%

Answer: D

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

Solve the problem.

99) In a recent survey at UCLA, some incoming freshmen students were asked if they planned to take more than one math class before they graduated. What is the population of interest here and what is the sample? 99) _____

Answer: The population is the entire freshman class at UCLA. The sample includes the particular freshmen who participated in the survey.

100) In the following table, gender is a categorical variable. Give one possible way the variable could have been coded. 100) _____

Age	Gender	Shoe Size
18	1	10
23	0	7
21	0	6
19	1	11
20	1	10

Answer: 2 possible ways to code: 0 - Male, 1 - Female; OR 0 - Female, 1 - Male

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

101) A gym is offering a new 6-week weight loss exercise program for its members. Members who sign up for the program are weighed and measured once a week for the duration of the program. The owners of the gym want to know if the weight loss program actually helps people lose weight. What variable could be a possible confounding factor in determining the cause of weight loss? 101) _____

A) The person's family structure.
B) The person's diet.
C) The person's marital status.
D) The person's commitment to the program.

Answer: B

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

In a recent study of 1200 adult smokers, 125 out of the 560 males in the study said they were interested in joining a help group to quit smoking.

102) What percent of the study's participants were female? 102) _____

Answer: $\frac{640}{1200} = 0.533 = 53.3\%$

Answer the question.

103) In a national safety report, the number of bicyclist fatalities in City X was 108 and the number of bicyclist fatalities in City Y was 59. Can we conclude that bicyclists are less safe in City X than in City Y? If you answered no, what additional data would allow us to make a conclusion about which city is less safe for bicyclists? 103) _____

Answer: We cannot conclude that bicyclists are less safe in City X than in City Y. The population of each city would be needed to compare the fatality percent or rate with respect to total population.

Solve the problem.

104) Researchers conducted an experiment to determine if having a dog day on college campuses during final exam week lowers students' stress levels. A dog day is when dogs from a local animal shelter are brought onto campus for students to play and interact with. What are the treatment and outcome variables for this experiment? 104) _____

Answer: Treatment variable - whether or not a campus had a dog day. Outcome variable - students' stress levels during final exams.

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

105) The table gives the GPA and gender of students in a business class. 105) _____

GPA	Female
3.54	1
3.20	0
3.87	0
3.86	1

Is the format of the data set stacked or unstacked?

A) unstacked B) stacked

Answer: B

106) A statistics student collected data from other students in her class who ride a bike to school. The following table shows data about their bikes: 106) _____

Color	Series Number	Weight (lbs)	Road Bike	Average Speed (mph)
Black	A120	31	0	16
Blue	B640	21	1	24
Green	C300	27	0	14
Black	D90	14	1	23

Observations were made on how many bikes?

A) 4 B) 20 C) 5 D) 7

Answer: A

1) B
2) C
3) B
4) We need to know the total number of men in State A and State B so that a comparison can be made of the percentage of the men in each state that are clinically obese. There could be a much higher male population in State B than State A. Also, assumptions about exercise and obesity are being made.
5) A
6) D
7) C
8) A
9) This is an observational study because the doctor did not randomly assign patients into groups. Instead, he simply looked at medical files.
10) B
11) A
12) The group sizes are different. There are 55 males, but only 45 females.
13) B
14) D
15) D
16) A
17) A
18) Answers will vary. Examples might include: categorical - gender, favorite candy, year in school, favorite color, etc.; numerical - age, height, weight, speed, etc.
19) C
20) D
21) C
22) In a blind study, the participants do not know which group they have been assigned to. For example, in a medical experiment, the patients do not know if they are receiving actual medication or just a placebo. In a double blind study, neither the researchers, nor the participants know which group the participants have been assigned to. A double blind study is better than a blind study.
23) Answers will vary. Examples might include: Facebook postings, Twitter tweets, Instagram photos, emails sent/received, credit/debit card swipes, GPS, text messaging, etc.
24) A
25) B
26) B
27) B
28) B
29) A
30) C
31) D
32) B
33) D
34) D
35) A
36) $\frac{125}{560} = 0.223 = 22.3\%$
37) B
38) A
39) A
40) B
41) C

42) It cannot be conclude that Model 1 smart phones screens are more fragile than Model 2 smart phone screens . We need to know the percentage of each type of smart phone model brought into the store for screen repairs. To find this percentage, the number of each type of smart phone models that are in the population is required. Model 1 smart phones could be a lot more popular than Model 2 smart phones, for instance.
43) C
44) C
45) B
46) A
47) A
48) A
49) C
50) B
51) $\frac{75}{100} = 0.75 = 75\%$
52) No, this is an observational study and we cannot conclude causation.
53) Answers will vary. Examples might include: a student's access to other help/tutoring programs, a student's major on campus (e.g. a mathematics major versus a history major), a student's study skills prior to the program, etc.
54) C
55) A
56) Yes, a higher percent of patients who took the medication had fewer migraines $\left(\frac{185}{275} = 67.3\%\right)$ than the patients who took the placebo $\left(\frac{70}{275} = 31.1\%\right)$
57) C
58) Answers will vary. Examples might include: (1) a pregnancy blog references a few individual women's experiences with cocoa butter lotion and its reduction of stretch marks, (2) a local health store includes quotes from 5 customers on an advertisement that claims coconut oil consumption can reduce stress and improve health, (3) a commercial for skincare products interviews a small group of people that claim the product has cured their acne, etc.
59) A
60) It is not known the percentage of the student body in the two cafeterias on Friday. The larger number of students eating at the first cafeteria on Friday could be because the first cafeteria has a larger capacity than the second cafeteria or that it is closer to campus.
An alternate possibility could be that we don't know the number of students on campus that Friday. Quite possibly the university has more than 45 students, and we don't know what the rest of them ate. (Presumably they went off campus or brought their own food.)
61) D
62) B
63) A
64) $\frac{185}{185 + 90} = \frac{185}{275} = 0.6727 = 67.3\%$
65) This is stacked data because each row represents one person.
66) C
67) D
68) A
69) C
70) This is a controlled experiment because the students are randomly assigned to the treatment group (true/false test) and the control group (multiple choice test).
71) D
72) A

73) C
74) C
75) C
76) A
77) A
78) C
79) B
80) A
81) A
82) A
83) B
84) D
85) A
86) C
87) B
88) B
89) A
90) C
91) Yes, this is a controlled experiment. Since a higher percent of patients who took the medication had fewer migraines, we can conclude causation.
92) B
93) A
94) C
95) D
96) Two categorical variables. Answers will vary. Examples might include: gender & favorite color, gender & year in school, year in school & favorite animal, etc.
97) B
98) D
99) The population is the entire freshman class at UCLA. The sample includes the particular freshmen who participated in the survey.
100) 2 possible ways to code: 0 - Male, 1 - Female; OR 0 - Female, 1 - Male
101) B
102) $\frac{640}{1200} = 0.533 = 53.3\%$
103) We cannot conclude that bicyclists are less safe in City X than in City Y. The population of each city would be needed to compare the fatality percent or rate with respect to total population.
104) Treatment variable - whether or not a campus had a dog day. Outcome variable - students' stress levels during final exams.
105) B
106) A