Chapter 1 Test A - Multiple Choice

Section 1.1 (What are Data?)

1. [Objective: Understand data.] Data can be defined as *numbers in context*. Suppose you are given the following set of numbers:

   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. Units of measurement. This could represent the heights of six 20-year-olds, in meters.
   c. We need to know where these numbers were collected.
   d. We need to know who collected these numbers.

Section 1.2 (Classifying and Storing Data)

2. [Objective: Understand methods for coding categorical variables.] According to the following data table, which variable(s) is(are) categorical?

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. None are categorical because there are only numbers in the table
   b. Age, gender, and ethnicity
   c. Gender and ethnicity
   d. Gender

3. [Objective: Distinguish between stacked and unstacked data.] The following data table is organized using which method?

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

   a. This is stacked data because the ages are separated by groups (in this case, gender).
   b. This is stacked data because each row represents one person.
   c. This is unstacked data because the ages are separated by groups (in this case, gender).
   d. This is unstacked data because each row represents one person.

4. [Objective: Distinguish between numerical and categorical variables.] Determine which of the following five variables are numerical and which are categorical.

age, gender, weight, ethnicity, favorite math class

   a. All of the variables are categorical.
   b. All of the variables are numerical.
   c. Age, weight, and favorite math class are numerical variables. Gender and ethnicity are categorical variables.
   d. Age and weight are numerical variables. Gender, ethnicity, and favorite math class are categorical variables.

5. [Objective: Distinguish between a population and a sample.] 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?

   a. All students who are satisfied with the course offerings.
   b. All students who are not satisfied with the course offerings.
   c. All students who attend the school.
   d. All students who participated in the poll.

Section 1.3 (Organizing Categorical Data)

6. [Objective: Understand what types of variables are used in two-way tables.] A two-way table is useful for describing which types of variables?

   a. Two numerical variables.
   b. Two categorical variables.
   c. One numerical variable.
   d. One numerical variable and one categorical variable.

7. [Objective: Find and use rates (including percentages).] In a study of 1200 adults, 480 out of the 630 women in the study said they attended a state college or university. What percent of the study's participants were women?
   a. 40%
   b. 47.5%
   c. 52.5%
   d. 76.2%

8. [Objective: Find and use rates (including percentages).] In a study of 1200 adults, 480 out of the 630 women in the study said they attended a state college or university. What percent of women attended a state college or university?
   a. 40%
   b. 47.5%
   c. 52.5%
   d. 76.2%

9. [Objective: Find and use rates (including percentages).] According to the following two-way table, what percent of people in the sample prefer dogs?

	Male	Female
Dog	40	25
Cat	25	10

a. 25%
b. 35%
c. 40%
d. 65%

10. [Objective: Understand when and why percents are more useful than counts for describing and comparing groups.] According to the following two-way table, why are percentages more useful than counts to compare pet preferences between males and females?

	Male	Female
Dog	40	25
Cat	25	10

a. There are more males than females in the sample.
b. There are more people who prefer dogs than cats in the sample.
c. You should only use counts in a two-way table.
d. You should only use percentages in a two-way table.

Section 1.4 (Collecting Data to Understand Causality)

11. [Objective: Distinguish between observational studies and controlled experiments.] Determine if the following scenario is an observational study or a controlled experiment.

> 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.

a. Observational study
b. Controlled experiment
c. Neither

12. [Objective: Distinguish between observational studies and controlled experiments.] Determine if the following scenario is an observational study or a controlled experiment.

> 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.

a. Observational study
b. Controlled experiment
c. Neither

13. [Objective: Understand difference between treatment and outcome variables.] 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?

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

14. [Objective: Understand when it is possible to infer a cause-and-effect relationship from a research study and when it is not.] 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?

    a. Yes, this is an observational study and we can conclude causation.
    b. Yes, this is an experiment and we can conclude causation.
    c. No, this is an observational study and we cannot conclude causation.
    d. No, this is an experiment and we cannot conclude causation.

15. [Objective: Suggest confounding variables that are likely to occur in some situations.] 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?

    a. The person's commitment to the program.
    b. The person's marital status.
    c. The person's family structure.
    d. The person's diet.

16. [Objective: Determine when information is anecdotal.] 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?

    a. Yes, the claims are true stories, so we do have evidence of the health benefits.
    b. No, the claims are lies, so we do not have evidence of the health benefits.
    c. Yes, the claims are anecdotes and give us a good comparison group to find health differences.
    d. No, the claims are anecdotes and do not give us a true comparison group to find health differences.

17. [Objective: Understand different requirements for controlled experiments.] What does it mean for an experiment to be double-blinded?

    a. The researcher does not know which participants are in the treatment and control groups.
    b. The participants do not know who is in the treatment and control groups.
    c. Neither the researcher nor the participants know who is in the treatment and control groups.
    d. The researcher and the participants know which group they are in because it is unethical to keep this information from them.

Use the following information for questions (18) - (20):

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	65	90

18. [Objective: Understand when it is possible to infer a cause-and-effect relationship from a research study and when it is not.] What percent of patients who took the medication had improved symptoms?

    a. 41%
    b. 54%
    c. 65.2%
    d. 75.9%

19. [Objective: Understand when it is possible to infer a cause-and-effect relationship from a research study and when it is not.] Was the new medication effective in treating hypothyroidism?

    a. Yes, a higher percent of patients who took the medication had improved symptoms than the patients who took the placebo.
    b. Yes, both groups had more patients with improved symptoms.
    c. No, the patients who took the placebo also had improved symptoms.
    d. No, this was not a controlled experiment.

20. [Objective: Understand when it is possible to infer a cause-and-effect relationship from a research study and when it is not.] Can we conclude that the improved symptoms were caused by the new medication?

    a. Yes, this is a controlled experiment. Since a higher percent of patients who took the medication had improved symptoms, we can conclude causation.
    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. No, even though this is a controlled experiment, there might be a confounding factor since the placebo group had improved symptoms too.

Chapter 1 Test A - Answer Key

1. B
2. C
3. C
4. D
5. C
6. B
7. C
8. D
9. D
10. A
11. B
12. A
13. B
14. C
15. D
16. D
17. C
18. D
19. A
20. A