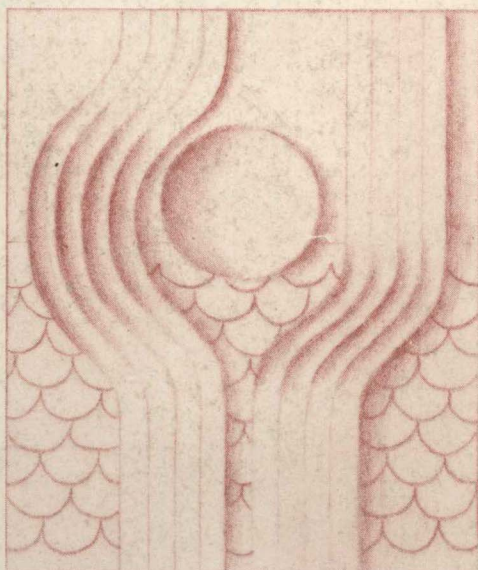
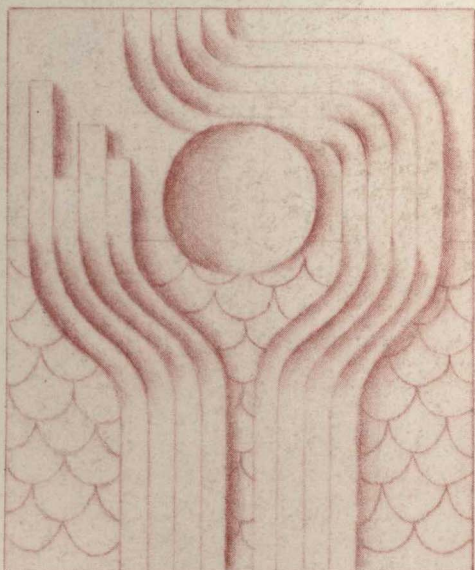
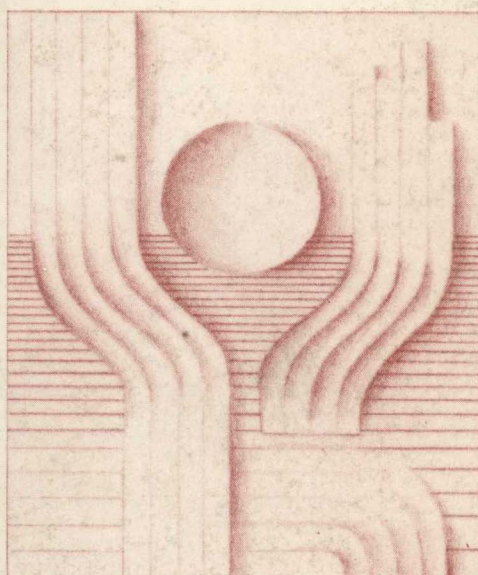
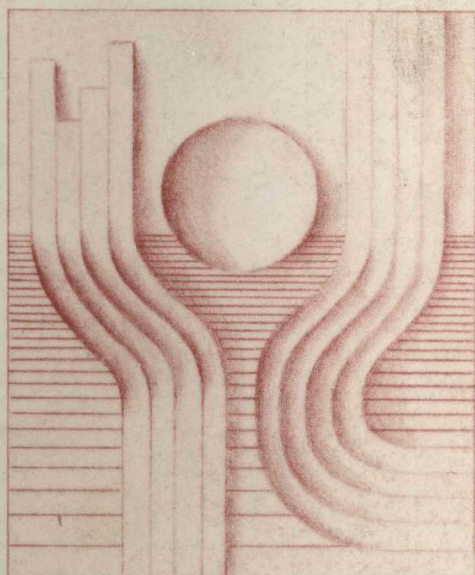


STUDY GUIDE TO ACCOMPANY

Fundamentals of Social Statistics

John C. Touhey



Study Guide to accompany

Fundamentals of Social Statistics

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PREFACE

Each chapter of the Study Guide to Accompany Fundamentals of Social Statistics covers a corresponding chapter in your text, and it provides several exercises that will alert you to any materials that require further study. By rereading of the text, you will increase your overall mastery of the subject matter of statistics. Each chapter of the study guide is divided into the following sections:

Learning Objectives: A concise listing of the basic statistical concepts and principles presented in each chapter. These objectives are organized to follow the order of presentation of each chapter.

Programmed Review: A sentence completion exercise in which you learn the use of the most important terms presented in each chapter of the text. These exercises are organized within the learning objectives of the preceding section, and answers are presented to the right of each exercise.

Multiple-Choice Questions: Items designed to test your recall of the most important terms and concepts presented in each text chapter. Answers appear at the right of each objective question, and this is an extremely valuable exercise for multiple choice examinations in basic statistics.

Problems: Thought problems require a minimum of arithmetic, and they are designed to check your understanding of important statistical relationships. Computational problems are designed to require the use of a desk calculator or a pocket calculator, and the computational equations presented in the text should be used to solve these problems. Answers to thought problems and computational problems appear at the end of each chapter.

Any study guide can be improved, and we welcome all suggestions for future editions of this supplement.

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Chapter 1

THE DEFINITION OF STATISTICAL ANALYSIS

Learning Objectives

After mastering the content of this chapter, you should be able to:

1. Explain the uses of statistical knowledge in everyday life.
2. Define the terms most commonly used in statistics.
3. Describe the basic procedures of descriptive statistics.
4. Describe the basic procedures of inferential statistics.

Programmed Review

Objective 1. Explain the uses of statistical knowledge in everyday life.

1. For many decisions in everyday life, we are _____ probabilities required to assess the _____ of different outcomes.
2. Statistics is the study of the formal procedures used for collecting and analyzing _____. data
3. The statistical analysis of data helps us to make _____ and _____. decisions, inferences
4. Statistics may be regarded as making summary statements about the arithmetic properties of any _____ of numerical facts. collection
5. Statistics may also be regarded as a _____ method for dealing with data.

6. Statements that present numerical information in the form of a convenient summary are called _____ statistics. descriptive
7. Statements that generalize from samples to populations are called _____ statistics. inferential

Objective 2. Define the terms most commonly used in statistics.

1. Any characteristic of a person, group, or environment that may assume different values is a _____. variable
2. Any characteristic of a person, group, or environment that never changes is a _____. constant
3. The numbers and measurements that are collected as a result of scientific observation are called _____. data
4. The term data is the plural for _____. datum
5. A complete set of individuals, objects, or measurements having a common observable characteristic is a _____. population
6. All babies born in a specified time period would constitute a _____ population. finite
7. All babies who were ever born or will ever be born constitute an _____ population. infinite
8. A single member of a population is an _____. element
9. Any measurable characteristic of a population is a _____. parameter
10. It is a customary statistical practice to represent population parameters with _____. Greek letters
11. The population parameters μ and σ are called _____ and _____. "mu", "sigma"
12. A subset or part of a population is called a _____. sample
13. A sample in which all elements have an equal chance of being selected is a _____ sample. random
14. A number that describes a characteristic of a sample is called a _____. statistic

- | | |
|--|----------------------|
| 15. A statistic is frequently calculated from a sample in order to estimate a _____. | population parameter |
| 16. It is a customary procedure to represent sample statistics with _____. | italic letters |
| 17. Since parameters are rarely known it is necessary to estimate them from _____. | sample statistics |

Objective 3. Describe the basic procedures of descriptive statistics.

- | | |
|---|------------------------|
| 1. A widely used presentation for summarizing the overall picture of a mass of raw data is the _____. | frequency distribution |
| 2. The use of tables, graphs, and figures permit _____ presentation of raw data. | visual |
| 3. For some purposes, it may be useful to use descriptive statistics in order to convert raw scores into _____. | percentiles |
| 4. The descriptive statistics that describe the "typical" score in a sample are measures of _____. | central tendency |
| 5. Descriptive statistics that measure the spread of scores around a central point are measures of _____. | dispersion |
| 6. Descriptive statistics that measure relationships between two different variables are called _____. | correlations |
| 7. The statistical procedure that permits social scientists to predict one variable from another is called _____. | regression analysis |

Objective 4. Describe the basic procedures of inferential statistics.

- | | |
|--|-----------------------|
| 1. Inferential statistics are necessary in order to test _____. | hypotheses |
| 2. Inferential statistics are procedures for generalizing from samples to _____. | populations |
| 3. In the videotape vs. lecture study described in the text, the two treatment conditions were the _____ and _____ groups. | experimental, control |

4. When there is an average difference in the scores of experimental and control groups, inferential statistics attempt to eliminate explanations based on the factor of _____. chance
5. Inferential statistics are also known as _____ statistics. inductive
6. Inferential statistics are useful for arriving at conclusions that extend beyond _____ statistics. sample

Multiple-Choice Questions

1. The numbers or measurements that are collected as the result of observation are called b
 - a. elements
 - b. data
 - c. variables
 - d. parameters
2. The procedures used to organize and present data in convenient summaries are called a
 - a. descriptive statistics
 - b. inferential statistics
 - c. population parameters
 - d. dependent variables
3. A single member of a population is d
 - a. a sample
 - b. a statistic
 - c. a variable
 - d. an element
4. A population for whom all elements can be identified is called b
 - a. innumerable
 - b. finite
 - c. infinite
 - d. parametric
5. Procedures used to arrive at generalizations from sample data to population parameters are called c
 - a. random samples
 - b. descriptive statistics
 - c. inferential statistics
 - d. independent variables
6. Any characteristic of a finite population that can be measured is b
 - a. a sample
 - b. a parameter
 - c. data
 - d. an element
7. Any characteristic of an infinite population that can be estimated is b
 - a. a sample
 - b. a parameter
 - c. data
 - d. an element

8. A complete set of individuals, objects, or measurements having some common observable characteristic is
- a. a sample
 - b. an element
 - c. data
 - d. a population
9. Any characteristic of a person, group, or environment that can assume measurable differences is a
- a. variable
 - b. datum
 - c. statistic
 - d. parameter
10. A number that describes a mathematical characteristic of a sample is a
- a. parameter
 - b. statistic
 - c. datum
 - d. variable
11. A sample in which all elements have an equal chance of being selected is called
- a. parametric
 - b. simple random
 - c. stratified
 - d. matched
12. The two basic types of statistics are the
- a. prescriptive and descriptive
 - b. inductive and deductive
 - c. descriptive and inferential
 - d. prescriptive and normative
13. In everyday life, people behave statistically when they estimate the _____ of different events.
- a. opportunity
 - b. variability
 - c. likelihood
 - d. compatibility
14. In the study of statistics, Greek letters are most commonly used to identify
- a. independent variables
 - b. dependent variables
 - c. population parameters
 - d. sample statistics
15. In the study of statistics, italicized letters are most frequently used to represent
- a. independent variables
 - b. dependent variables
 - c. population parameters
 - d. sample statistics
16. Statistics that describe the spread of scores about a central point are
- a. measures of central tendency
 - b. measures of dispersion
 - c. correlations
 - d. percentiles

17. Statistics that describe the "typical" member of a sample or population are a
- a. measures of central tendency
 - b. measures of dispersion
 - c. correlations
 - d. percentiles
18. Statistics that describe the relationship between two different variables are c
- a. measures of central tendency
 - b. measures of dispersion
 - c. correlations
 - d. percentiles
19. Statistics that convert raw scores into rankings are called d
- a. measures of central tendency
 - b. measures of dispersion
 - c. correlations
 - d. percentiles

Chapter 2

BASIC MATHEMATICAL CONCEPTS

Learning Objectives

After mastering the content of this chapter, you should be able to:

1. Describe the skills that are necessary for the mastery of statistics.
2. Explain the grammar of mathematical notation.
3. Describe the summation rules for mathematical operations.
4. Describe the three different types of numbers and the four levels of measurement used in the development of scaling.
5. Explain the difference between discrete and continuous scales.
6. Explain the principles of rounding for the computation and presentation of statistical data.
7. Describe the use of ratios in the computation and presentation of statistical data.
8. Describe the uses of proportions, percentages, and rates in the computation and presentation of statistical data.

Programmed Review

- Objective 1. Describe the skills that are necessary for the mastery of statistics.
1. Student concerns about passing a statistics course mathematics are most likely to result from discouraging previous experiences with _____.

2. However, you do not have to be a mathematical genius to master the basic _____ of this text. statistical principles
3. The degree of mathematical sophistication necessary to understand fundamental statistics is often _____. exaggerated
4. According to the text, the mastery of statistics requires skills of arithmetic _____, sound _____, and determination. computation, logic
5. The highest level of mathematics required in the mastery of basic statistics is _____. algebra

Objective 2. Explain the grammar of mathematical notation.

1. X and Y are examples of mathematical _____. nouns
2. The mathematical nouns X and Y are frequently used to identify _____. variables
3. The symbol N represents the _____ of scores under consideration. number
4. Mathematical nouns are modified with mathematical _____. adjectives
5. The mathematical adjective X₁ is an example of a _____. subscript
6. The symbol for a subscripted score of any value is _____. X₁
7. Notations that direct arithmetic operations are mathematical _____. verbs
8. Mathematical verbs are commonly referred to as _____. operators
9. The mathematical operator Σ is a symbol for _____. summation
10. Notations that modify mathematical verbs are called mathematical _____. adverbs

Objective 3. Describe the summation rules for mathematical operations.

1. The sum of a constant added together N times is equal to N times that constant. Symbolically, this equation is represented as _____.
$$\sum_{i=1}^N c = Nc$$
2. The sum of a constant times each value of a variable is equal to the sum of the values of the variable times that constant. Symbolically, this equation is represented as _____.
$$\sum_{i=1}^N cX_i = c \sum_{i=1}^N X_i$$
3. The sum of the values of a variable plus a constant is equal to the sum of the values of a variable plus N times that constant. Symbolically, this equation is represented as _____.
$$\sum_{i=1}^N (X_i + c) = \sum_{i=1}^N X_i + Nc$$
4. The sum of the values of a variable when a constant has been subtracted from each is equal to the sum of the values of the variable minus N times the constant. Symbolically, this equation is represented as _____.
$$\sum_{i=1}^N (X_i - c) = \sum_{i=1}^N X_i - Nc$$

Objective 4. Describe the three different types of numbers and the four levels of measurement used in the development of scaling.

1. The numbers that are used to name objects or events are called _____ numbers. nominal
2. The numbers that represent position in a series are called _____ numbers. ordinal
3. The numbers that represent quantity are called _____ numbers. cardinal
4. The assignment of numbers to objects or events according to sets of predetermined rules is _____. measurement
5. The objects or events that social scientists observe and measure are called _____. variables
6. The particular observation of an object or event is called the _____ of the variable. value
7. The rules for placing individuals or objects into unordered categories which are homogeneous and mutually exclusive are _____ scales. nominal
8. Data derived from nominal scales are most often called _____ data or _____ data. frequency, categorical

- | | | |
|-----|--|--------------------|
| 9. | If the classes of measurement represent a rank-ordered series of relationships, the resulting measurement is an _____ scale. | ordinal |
| 10. | In the study of attitude measurement, Likert-type response categories are examples of an _____ scale. | ordinal |
| 11. | The highest level of measurement in science is represented by _____ and _____ scales. | interval,
ratio |
| 12. | The only difference between an interval scale and a ratio scale is that interval scales have an arbitrary _____. | zero point |
| 13. | In most of the statistical tests reported in this book, scaling is assumed at the _____ level. | interval |

Objective 5. Explain the difference between discrete and continuous scales.

- | | | |
|----|--|------------------|
| 1. | Scales with the basic characteristic of equality of counting units are called _____ scales. | discrete |
| 2. | Most of the discrete scales used by social scientists are expressed in terms of _____. | whole
numbers |
| 3. | A scale in which a variable may assume an infinite number of intermediate values is called a _____ scale. | continuous |
| 4. | When continuous variables are expressed as whole numbers, they may appear to be _____. | discrete |
| 5. | The numerical values of continuously distributed variables are always _____. | approximate |
| 6. | The value of a continuous variable plus or minus one-half of the unit of measurement is the _____ of the variable. | true limit |

Objective 6. Explain the principles of rounding for the computation and presentation of statistical data.

- | | | |
|----|---|------------------|
| 1. | With respect to the rounding of decimal data, the policy proposed in the text is to round to two more places than are in the _____. | original
data |
| 2. | According to this rule, original data that are in whole-numbered units should be rounded to the _____ decimal. | second |

3. When rounding, the last digit should be increased to the next higher number if the remainder beyond that digit is greater than _____. five
4. When rounding, the last digit should remain unchanged if the remainder beyond that digit is less than _____. five
5. If the remainder beyond the last digit is exactly 5, the digit at the decimal place should be rounded to the nearest _____. even number

Objective 7. Describe the use of ratios in the computation and presentation of statistical data.

1. The division of one quantity by another results in a _____. ratio
2. The number of individuals per 100 younger than 15 or older than 64 relative to those between the ages of 15 and 64 is the _____. dependency ratio
3. According to the text, the sex ratio for the United States in 1978 was _____. 94.7
4. According to the text, the dependency ratio for the United States is _____. 38.2
5. According to the text, the ratio of whites to nonwhites in the United States is about _____ to 1. 6.4

Objective 8. Describe the uses of proportions, percentages, and rates in the computation and presentation of statistical data.

1. The division of the quantity in one category by the total of all of the categories is a _____. proportion
2. Proportions may range in value from _____ to _____. 0, 1
3. When a proportion is multiplied by 100, it is converted into a _____. percentage
4. The difference between the quantity at time 2 and the quantity time 1 divided by the quantity at time 1 is the _____. percentage change
5. The concept of percentage change always computes change from an arbitrary _____. base

6. The number of occurrences in a group category rate
divided by the total number of elements in
the group is the _____.

Multiple-Choice Questions

1. The numbers that are used to represent quantity are called _____ numbers. a
a. cardinal c. nominal
b. ordinal d. continuous
2. The numbers that are used to name objects or events are called _____ numbers. c
a. cardinal c. nominal
b. ordinal d. continuous
3. The numbers that are used to represent the position in a series are called _____ numbers. b
a. cardinal c. nominal
b. ordinal d. continuous
4. Scales in which the variables can assume an infinite number of intermediate values are called c
a. discrete scales c. continuous scales
b. ordinal scales d. nominal scales
5. Scales in which the variables have an equality of counting units are called _____ scales. a
a. discrete c. continuous
b. ordinal d. nominal
6. Scales in which the categories are homogeneous, mutually exclusive, and unordered are called _____ scales. d
a. ratio c. ordinal
b. interval d. nominal
7. Scales with arbitrary zero points on which exact distances are known are called _____ scales. b
a. ratio c. ordinal
b. interval d. nominal
8. Scales with true zero points on which exact distances can be known are called _____ scales. a
a. ratio c. ordinal
b. interval d. nominal
9. Scales in which the observations can be ranked are called _____ scales. c
a. ratio c. ordinal
b. interval d. nominal