# Instructor's Manual, Solutions Manual, and Test Bank

*for*

Levin and Fox

# Elementary Statistics in Social Research The Essentials

## Third Edition

*prepared by*

Kruti Dholakia
University of Texas, Dallas

Sarah Rustan
Northeastern University

Steven Bogatz
Springfield College

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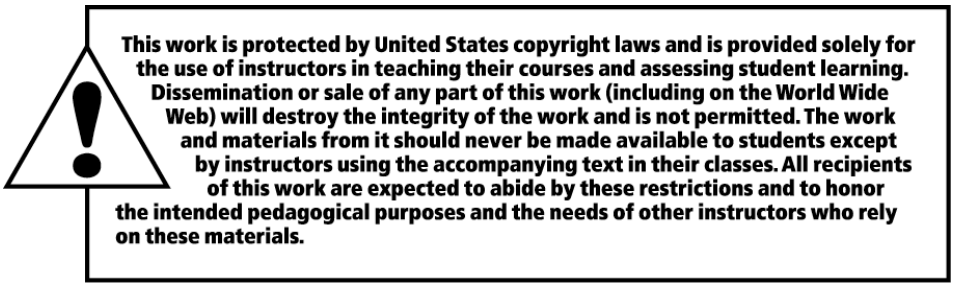


Allyn & Bacon
is an imprint of

PEARSON

www.pearsonhighered.com

ISBN-10: 0-205-63806-6
ISBN-13: 978-0-205-63806-2

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# Preface

Welcome to the Instructor's Manual for the third edition of Levin and Fox's *Elementary Statistics in Social Research: The Essentials.* This supplement is substantially different from those for previous editions, and we hope that the number of helpful tools available within the supplement will help you teach the statistics course in the social sciences more effectively and efficiently.

This Instructor's Manual consists of a set of tools available for each chapter. An "At-a-Glance" grid overviews the sections covered in each chapter from the main text and highlights other supplements that can be used in conjunction with the textbook and Instructor's Manual. The new and improved version of the Instructor's Manual contains "Learning Objectives," "Detailed Lecture Notes," "Summary," "Key Terms," "Lecture Launchers," and "Demonstrations and Activities" sections for each chapter. This detailed outline view is likely to help novice or seasoned instructors alike with class preparation and teaching. We have also incorporated overheads and handouts from previous editions that can be used to supplement teaching using alternative methods in the classroom. We have also continued, from previous editions, classroom exercises and handouts that can be used to help gauge the understanding level of students in the classroom. A corresponding answer key is also included at the end of the manual that will aid you with the assessment of your student's understanding.

The help received from previous editions of Instructor's Manuals and the publishers has been invaluable, but the errors remain mine. I sincerely hope that this Instructor's Manual meets your needs in taking the students down the path of Statistics in the Social Sciences. Here is to hoping for a fun-filled and exciting statistical journey for you and your students!

Kruti Dholakia, Ph.D.
Clinical Assistant Professor in Political Economy
The University of Texas at Dallas
Richardson, TX 75080

# Chapter 1: Why the Social Researcher Uses Statistics

## Chapter-at-a-Glance Grid

| Detailed Outline | Print Supplements | Media Supplements |
|---|---|---|
| **The Nature of Social Research p. 1** Variables and Constants • Unit of Observation • Aggregates • Hypothesis • Dependent and Independent Variables • Research Methods | **Test Bank**<br><br>**Handout 1.1** | **Companion Website:** www.mysockit.com |
| **Why Test Hypotheses p. 3** Reality vs. Perceptions | | |
| **The Stages of Social Research p. 4** Identify Problem • Develop Instruments • Collect data • Analyze Data • Analyze Results | **Test Bank** | |
| **Using Series of Numbers to Do Social Research p. 5** Levels of Measurement • Nominal • Ordinal • Interval/Ratio • Different Ways to Measure the Same Variable • Discrete and Continuous Variables | **Test Bank**<br><br>**Handout 1.1** | **Overview of Statistical Thinking:** http://faculty1.coloradocollege.edu/~mduncombe/web/levels.htm<br><br>This Web site gives an overview of the levels of measurement discussed in chapter 1. |
| **The Function of Statistics p. 12** Description or Decision Making • Rounding Off | **Test Bank** | |
| **Summary p. 18** | | |
| **Questions and Problems p. 18** | | |

## Learning Objectives

- Recognize the importance of social research and its dependence on statistics
- Recognize the steps of hypothesis testing
- Recognize various levels of measurement of each variable
- Recognize dependent and independent variables clearly

## Detailed Lecture Outlines

**The Nature of Social Research –** Using past experiences, either our own or those of others, to make predictions for future situations, we are acting as researchers on an informal basis. Social scientists observe and make predictions for society and social behaviors.

- **Variables and Constants –** Aspects such as gender of mother (female!) are constants among population, whereas aspects such as age of mother are variable either across population or over time.
- **Unit of Observation –** Data on individuals or aggregate data such as cities or households.

- **Hypothesis** – Statement of relationship between two or more variables.
- **Dependent and Independent Variables** – Independent variables are usually the "cause," whereas the dependent variables are the "consequence."
- **Research Methods** – Experiment; survey; participant observation; secondary analysis.

**Why Test Hypotheses?** The social reality of some matters is likely to be different from commonly held perceptions, so hypothesis testing helps us to empirically test the validity of relationships.

**The Five Stages of Social Research:**

1. Identify problem
2. Develop instruments
3. Collect data
4. Analyze data
5. Analyze results

**Using Series of Numbers to Do Social Research** – Data helps with performing statistical analysis and testing hypotheses.

- Three major levels of measurement – nominal, ordinal, and interval/ratio
- Same variable can be measured using different levels depending on the hypothesis
- Variables can be discrete or continuous

**The Function of Statistics –** Statistics functions as a tool of description or decision making.

- Data can be described and analyzed through frequency distributions, graphs, or by the basic descriptive statistics.
- Rounding Off – We usually round off the final answer to two decimal places and do not round off while calculating the intermediate steps.

# Summary (page 18)

In the first chapter we linked our everyday predictions about the course of future events with the experiences of social researchers who use statistics as an aid in testing their hypotheses about the nature of social reality. Almost daily, ordinary people take educated guesses about the future events in their lives. Unlike haphazard and biased everyday observations, however, researchers seek to collect *systematic* evidence in support of their ideas. Depending on the particular level of measurement, series of numbers are often employed by social researchers to categorize (nominal level), rank (ordinal level), or score (interval/ratio level) their data. Finally, social researchers are able to take advantage of two major functions of statistics in the data-analysis stage of social research: description (that is, reducing quantitative data to a smaller number of more convenient descriptive terms) and decision making (that is, drawing inferences from samples to populations).

## Key Terms

Hypothesis
Variable
Experiment
Measurement
Level of measurement
Nominal
Ordinal
Interval/Ratio

## Lecture Launchers and/or Discussion Topics

The textbook has some examples on current events or relevant social events that might interest the students. However, it is important to pick a topic other than those from the textbook in order to better inform students as to the relevance of statistics. Pick a newspaper article at random and illustrate to students how social research is relevant.

## Demonstrations and/or Activities

Pick any current health issue, such as depression or cancer, and try to get students to determine what the independent variables might be for such an issue. Clearly demonstrate how the outcome is the dependent variable, whereas the inputs are all independent variables in such cases.

## HANDOUT 1.1
## DETERMINING LEVELS OF MEASUREMENT

**Taken from Chapter 1, the following handout can be used as a quiz, an in-class assignment, or for discussion. The features that you might point out are as follows:**

- Nominal variables classify or categorize; they include dichotomies, those variables with only two choices or reorganized into two categories.

- Ordinal variables rank or order the variable attributes in a logical or meaningful way.

- Interval variables assign a score that is at an equal distance, or "interval," from those scores adjacent to them. This allows a greater number of mathematical operations.

# Handout 1.1

Name: _____ Date: _____ Class: _____

## LEVELS OF MEASUREMENT

1. Suppose you were interviewing people about their views on gun control. You ask the respondents the following question: How much do you agree or disagree with this statement: "The United States needs stiffer laws controlling the purchase and ownership of guns." The respondents are then asked to rank their feelings on the following scale: strongly agree, somewhat agree, neither agree or disagree, somewhat disagree, or strongly disagree. What level of measurement would you be using?

    a. ratio
    b. ordinal
    c. nominal
    d. interval

2. The jersey numbers associated with players on a baseball team are examples of scores on a(n) _____.

    a. nominal scale
    b. ratio scale
    c. interval scale
    d. ordinal scale

3. Compared to the ordinal level of measurement, the interval level _____.

    a. not only indicates the order of categories, but also the exact distance between them
    b. does not provide labeling of each score
    c. starts from a true zero point
    d. only categorizes

4. Statistics can be used to _____.

    a. reduce data to more easily understood descriptive terms
    b. generalize results
    c. determine when an observed difference between two or more groups is the result of chance, or when it is the result of "real" differences between groups
    d. all of the above

5. Sociologists use measurement to _____.

    a. classify or categorize data
    b. order data
    c. assign a score
    d. all of the above

# Handout 1.1 Continued

Name: _____ Date: _____ Class: _____

6. Nominal measurement is used primarily to _____.

    a. classify or categorize data
    b. order data
    c. assign a score
    d. all of the above

7. Ordinal measurement is used primarily to _____.

    a. classify or categorize data
    b. order data
    c. assign a score
    d. all of the above

8-16. In each of the following examples, classify the measurement type as one of the following:

    a. nominal
    b. ordinal
    c. interval

8. What dorm you live in _____

9. Number of children in a family _____

10. Tuition in dollars _____

11. Attitudes toward premarital sex between consenting adults (always wrong, usually wrong, sometimes wrong, never wrong) _____

12. The numbers on an athlete's jersey _____

13. Racial categories _____

14. Fear of crime (a lot, some, none) _____

15. Number of hours per week survey respondent watches TV _____

16. Number of stolen cars in a city _____

# Handout 1.1 Continued

Name: _____ Date: _____ Class: _____

**17-20.** In each of the following examples, identify the independent and dependent variables.

17. A social researcher is attempting to look at the relationship between race and income.

18. A sociologist tries to do research on religious affiliation and views on premarital sex.

19. A sociologist tries to examine the relationship between being drunk and a person's bowling scores.

20. A sociologist tries to examine the relationship between political party affiliation and views on the war in Iraq.

# Chapter 2: Organizing the Data

## Chapter-at-a-Glance Grid

| Detailed Outline | Print Supplements | Media Supplements |
|---|---|---|
| **Frequency Distribution of Nominal Data p. 25**<br>Raw Data into Meaningful Set of Measures • Two Columns | | **Companion Website:**<br>www.mysockit.com |
| **Comparing Distributions p. 26** | | |
| **Proportions and Percentages p. 26**<br>Standardizing Frequency Distributions | **Test Bank: 2.1-2.4** | |
| **Simple Frequency Distributions of Ordinal and Interval Data p. 28**<br>Highest to Lowest or Vice Versa Arrangement • Making Results Readable | **Test Bank: 2.5-2.6**<br><br>**Overhead: I** | |
| **Grouped Frequency Distributions of Interval Data p. 29**<br>Range • Class Size • Class Limits • The Midpoint • Guidelines for Class Intervals •Percentage Distribution | **Test Bank: 2.7-2.11; 2.29-2.30; 2.32** | |
| **Cumulative Distributions p. 31**<br>Cumulative Frequencies • Cumulative Percentage | **Test Bank: 2.3; 2.12-2.19;** | |
| **Dealing with Decimal Data p. 33**<br>Attention to Class Limits | | |
| **Flexible Class Intervals p. 35** | **Test Bank: 2.32** | |
| **Cross-Tabulations p. 37**<br>Marginal Distributions • Total Percents • Row Percents • Column Percents • Choosing among Total, Row, and Column Percents | **Test Bank: 2.20-2.23; 2.35**<br><br>**Handout 2.1** | |
| **Graphic Presentations p. 43**<br>Pie Charts • Bar Charts • Frequency Polygons • The Shape of a Frequency Distribution • Line Charts | **Test Bank: 2.24-2.28; 2.33-2.34**<br><br>**Overhead: II** | **Using Charts:**<br>http://www.strategiccomm.com/usecharts.html<br>This website offers some advice on how to use charts to show data. |
| **Summary p. 50** | | |
| **Questions and Problems p. 51** | | |

## Learning Objectives

Students should be able to do the following at the end of this chapter:

1. Make simple frequency distributions out of raw data
2. Make grouped and cumulative distributions out of raw data
3. Calculate class limits, midpoints, cumulative frequencies, frequency percentages, and cumulative percentages for a given distribution
4. Identify types of graphs and graphical representations

# Detailed Lecture Outlines

**Frequency Distributions of Nominal Data –** The social researcher uses formulas to transform raw data into a meaningful and organized set of measures that can be used to make or support hypotheses. Frequency distribution of nominal data consists of two columns (see table 2.1 in text).

**Comparing Distributions –** Used to clarify results and add information by comparing two or more frequency distributions. A need to standardize arises to make distributions comparable using some of the following methods:

**Proportions and Percentages** – Proportion compares number of cases in a given category with the total size of the distribution.

Proportion: $P = \frac{f}{N}$

Percentage: $\% = \frac{(100)f}{N}$

**Simple Frequency Distributions of Ordinal and Interval Data –** Nominal level data are in no particular order but ordinal data are in a hierarchal order of some sort. Need to maintain order while presenting data for more readability (see table 2.4 and 2.5 on p. 61).

**Grouped Frequency Distributions of Interval Data –** Interval data over a wide range implies that simple distributions may become tedious. A grouped frequency distribution resolves this issue by using class intervals of same or different sizes. A column for percentage distribution is also included alongside the frequency distribution column in grouped frequency distributions.

**Class Limits** – Each interval has an upper limit and a lower limit, which are located at the halfway point between adjacent class intervals. Distance between the upper limit (U) and the lower limit (L) gives the value for class size.

**Midpoint** – The middlemost score value in the class interval is the midpoint (m) of a class interval. Textbook formula is on p. 64.

$$m = \frac{\text{lower limit value} + \text{upper limit value}}{2}$$

**Guidelines for Constructing Class Intervals** – Need to stress that researchers make decisions on intervals based upon their objectives. Too few or too many intervals can make data more confusing. Whole numbers work better for class intervals than decimals. Following norms in the literature is a good approach to adopt.

**Cumulative Distributions** – See table 2.8 on p. 66. Cumulative frequencies (cf) are defined as total number of cases having any given score or a score that is lower; obtained by adding frequency of all categories in a class or frequencies of all class intervals lower than the given class. Cumulative percentages (c%) are obtained based upon the cumulative frequencies in a table.

$$c\% = \frac{(100)cf}{N}$$

**Dealing with Decimal Data** – Works the same way as whole numbers. See table 2.10 on p. 70.

**More on Class Limits** – It might help to have inclusive lower-limit class intervals, such that the distribution is continuous. This helps to avoid issues of having numbers, such as 29.5 years, that are hard to identify or place. Using halfway points between class intervals or lower values of each interval is a matter of personal choice and logic. It just has to be consistent within a given problem.

**Flexible Class Intervals** – Intervals do not all have to be the same size; the interval size depends on the purpose of the study. Income studies often use different size intervals to accommodate people earning on lower scales and higher scales differently. Unbounded upper-most or lower-most class intervals need midpoints set by common sense rather than any hard and fast rules.

**Cross-Tabulations** – A cross-tabulation is a table that presents the distribution (frequencies and percentages) of one variable (usually dependent variable) across the categories of one or more additional variables (independent variable or variables). See table 2.16 on p. 76. Row percentages give the distribution of the column variable for each value of the row variable. Row percentages sum to 100% across each row. Column percentages give the distribution of the row variable for each value of the column variable and sum to 100% across each column.

Total Percentages: $total\% = \frac{(100)f}{N_{total}}$

Row Percentages: $row\% = \frac{(100)f}{N_{row}}$

Column Percentages: $column\% = \frac{(100)f}{N_{column}}$

**Choosing among total, row, and column percents** – If the independent variable is on the rows, use row percents; if the independent variable is on the columns, use column percents. If there is no clear-cut independent variable, use total, row, or column percents, whichever is more meaningful for the particular research focus.

**Graphic Presentations –** Pie charts, bar graphs, histograms, frequency polygons, and line charts make a visual representation of the data for increased readability of findings. This section is best explained in the book and starts on p. 43. Frequency distributions can be negatively skewed, positively skewed, or symmetrical (bell-shaped curve).

## Summary (page 50)

In this chapter, we introduced some of the basic techniques used by social researchers to organize the jumble of raw numbers that they collect from respondents. The first step when working with nominal data is usually to construct a frequency distribution in the form of a table which presents the number of respondents in all of the categories of a nominal-level variable or compares different groups on the categories of the same variable.

Comparisons between groups or time periods can also be made by means of proportions, percentages, and rates. For the purpose of presenting ordinal or interval data, there are simple, grouped, and cumulative frequency (and percentage) distributions. Frequency and percentage distributions can be extended to include two and even more dimensions. In a cross-tabulation, the table presents the distribution of frequencies or percentages of one variable (usually, the dependent variable) over the categories of one or more additional variables (usually, the independent variable).

There are three possible ways to determine percentages for cross-tabulations: row percents, column percents, and total percents. The choice between row and column percents depends on the placement of the independent variable within the cross-tabulation. Total percents are occasionally used instead, but only when neither the row nor the column variable can be identified as independent.

Graphic presentations are often employed to enhance the readability and appeal of research findings. Pie charts have limited utility, being most appropriate for providing a simple illustration of nominal-level data that can be divided into only a few categories. Bar graphs and histograms are more widely used because they can accommodate any number of categories. Stressing continuity along a scale, frequency polygons are especially useful for depicting ordinal and interval data. Finally, line charts are particularly useful for tracing trends over time.

## Key Terms

Frequency distribution
Percentage distribution
Proportion
Percentage
Grouped frequency distribution
Class interval
Class limit
Midpoint
Cumulative frequency
Cumulative percentage
Median
Cross-tabulation
Total percent
Row percent
Column percent
Pie chart
Bar graph
Histogram
Frequency polygon
Negatively skewed distribution
Positively skewed distribution
Line chart

## Lecture Launchers and/or Discussion Topics

Large-scale numbers stress students out, and you are likely to face some skepticism from class when you present the first distribution. It is a good idea to use some visual aids. Demonstrating how to create a frequency distribution table step by step (and manually) in class is recommended.

# Demonstrations/Activities

Ask students questions about some category of your choice (political affiliation, gender, class level) and show them how data is collected for a nominal distribution table. For class interval construction, you can select intervals of your choice (15-24, 25-34, etc.) and place the frequencies in each class from among the students. Later on, you can combine either of these with gender to create cross-tabulations. This demonstrates a hands-on approach, which many students will appreciate and which will help them absorb information better.

## HANDOUT 2.1
## ORGANIZING THE DATA

**Taken from Chapter 2, the following handout can be used as a quiz, an in-class assignment, or for discussion. The features that you might point out are as follows:**

- In frequency distributions, the sample size (N) is calculated by summing the frequency column.

- In frequency distributions, determining whether a cumulative percent or cumulative frequency is appropriate depends upon the level of measurement.

- This might be a good time to introduce the idea of central tendency by asking students to describe what is common or typical about the distribution.

# Handout 2.1

Name: _____ Date: _____ Class: _____

1. A survey of 1,250 people asked how often each person used the Internet. On the survey, 96 responded that they never use it, 214 said they rarely use it, 572 said they use it occasionally, and 368 said they used it all the time.

   1.a. Fill in the table below with the frequencies and percents for each category. Remember to create a table whose categories are arranged logically.

| Internet Usage | f | % | C% |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| N = | | | |

   1.b. What does N equal? _____

   1.c. What is the level of measurement? _____

2. Below are the numbers of children respondents reported as having. Fill in the table below with the frequencies and percents for each category.

| # Kids | f | % | CF | C% |
|---|---|---|---|---|
| 7 | 23 | | | |
| 6 | 24 | | | |
| 5 | 54 | | | |
| 4 | 127 | | | |
| 3 | 215 | | | |
| 2 | 375 | | | |
| 1 | 255 | | | |
| N = | | | | |

   2.a. What does N equal? _____

   2.b. What is the level of measurement? _____