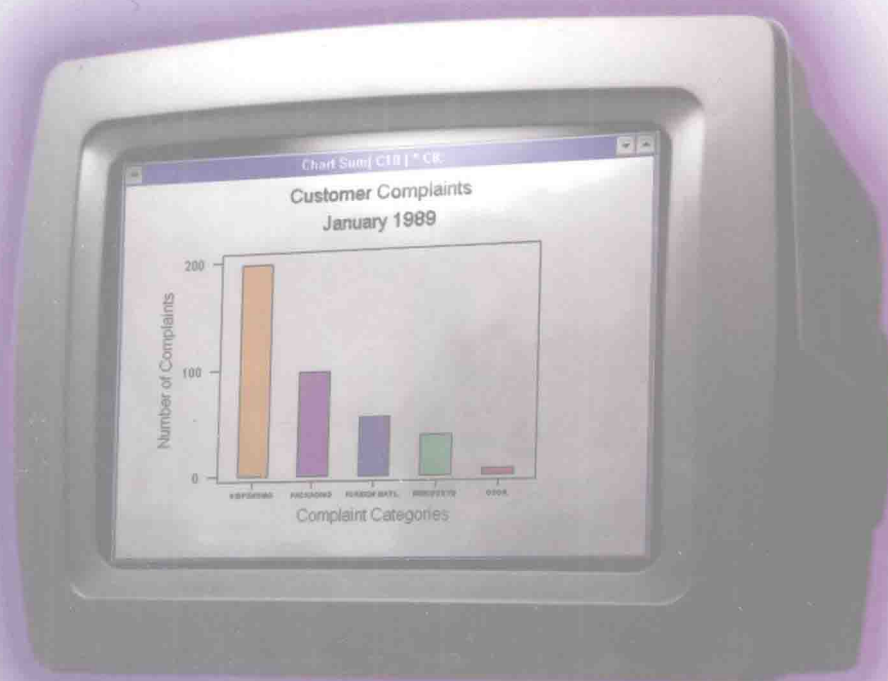


DOING STATISTICS *with* MINITAB FOR WINDOWS™

*Release 10:
An Introductory Course Supplement*

FOR EXPLORATIONS IN DATA ANALYSIS



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DOING STATISTICS

With

MINITAB for Windows™

Release 10

AN INTRODUCTORY COURSE SUPPLEMENT
FOR EXPLORATIONS IN DATA ANALYSIS

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This book is dedicated to friendship.

*"It is not often that someone comes along who is a true
friend and a good writer. "*

- E.B. White, Charlotte's Web

Preface

To The Student:

Data! Data! Data! It is everywhere and growing at an incredible rate. As our computer technology allows us to capture, store and retrieve more and more data, we must be able to transform that data into information. The information can then be used to make business decisions at all levels ranging from day-to-day decisions to short-term decisions to long-term strategic planning decisions. We can no longer compete internationally by making decisions based solely on experience and intuition. We must be able to see the information in the data.

This workbook is designed to help you learn how to see the valuable information in data. Each chapter is designed to allow you to explore a single statistical concept by investigating a data set. The situations which led to the collection of the data sets are based on actual consulting experiences of the authors.

It becomes quickly obvious that you can not investigate a data set without the assistance of a computer package. The computer package which is used in this workbook is known as Minitab for Windows Release 10. The commands necessary to use this package are explained in each chapter. If you are using the Student Edition of Minitab for Windows there may be some minor differences between the screens you see and the ones shown in the workbook.

To The Instructor:

This workbook is designed to be used by students enrolled in a basic course in Statistics. It is built around the premise that students must *Do Statistics* in order to truly understand the statistical concepts. Thus, each chapter reinforces a topic from a standard statistics course. It is

expected that the student can work independently or as a member of a team of students.

The workbook is self-contained in that all of the instructions needed to use the software are explained in the appropriate chapter. NO additional material needs to be presented by the instructor. The instructor can assign the workbook chapters which go with the statistical lecture material. Space is provided for the students to write the answers in the workbook, if so desired.

Each chapter contains two types of exercises: (1) exercises to help the student learn the command structure of Minitab for Windows Release 10 and (2) exercises to help the students see the statistical concepts in action. The chapter is motivated by an actual problem drawn from the authors consulting experiences. The dataset is then explained and the remainder of each chapter is dedicated to two major goals:

(1) to provide the student with detailed command instructions for using Minitab for Windows to accomplish the desired statistical analysis;

and

(2) to provide the student with a set of structured exercises designed to direct the students statistical thinking in order to reinforce the statistical tool of the chapter.

Acknowledgment

The authors wish to acknowledge Minitab Inc. for supplying each of them with a copy of Minitab for Windows Release 10 and a copy of the Student Version of Minitab for Windows. Further information about the software can be obtained by contacting Minitab directly at the following address:

Minitab Inc.
3081 Enterprise Drive
State College, PA 16801-3008 USA

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Chapter 1 "Why *Do* Statistics in Minitab for Windows?"

An Introduction to the Workbook

Section 1.1 Overview

This chapter discusses the following topics:

- Objectives of the workbook
- Description of the Data Sets
- Organization of the Workbook
- How to use the Workbook

Section 1.2 Objectives of the Workbook

This workbook has two major objectives. They are:

- (1) to allow you to *see* the statistical concepts taught in a standard course in statistics at work by *doing statistics* with real life data sets using the Minitab for Windows software and;
- (2) to help you *learn how to use Minitab for Windows*.

At first glance, these may appear to be rather separate and unrelated objectives. In fact, they are supportive of each other. The workbook is designed around the premise that in order to truly understand the statistical concepts you must *do statistics* using real life data sets and in order to *do statistics* you must use a statistical software package. Thus by exploring the data sets you will learn both the statistical tools and the command structure of the software.

Section 1.3 Description of the Data Sets

Each chapter uses one data set whose subject is hinted at in the title of the chapter. In a few cases a data set may be used for more

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than one chapter. In these cases, the details of the data set are provided in the first chapter that uses this data set.

The data sets are based on actual business situations and in all cases reflect actual problems. They are drawn from the consulting experiences of the authors. The names of the companies have not been provided in order to maintain confidentiality agreements. However, the problem descriptions, the variables and the data are real. The data sets are also large enough to (1) allow you to see the need for a statistical software package and (2) to explore patterns and relationships.

Section 1.4 Organization of the Workbook

The workbook is divided into two major parts.

Part I: Basics of Windows and Minitab for Windows

Chapter 2 explains some basic Windows commands. Chapter 3 gets you started in Minitab for Windows Release 10. It covers the basic structure and commands for Minitab for Windows Release 10. After reading this chapter you will be ready to move on to the remaining chapters of this workbook. Specific commands and software features will be explained in the chapters where they are needed for the statistical analysis.

Part II: Statistics

Chapters 4-15 are the chapters where you will be *Doing Statistics*.

Each chapter is designed to allow you to explore a single statistical concept by investigating a data set. The chapters follow the normal sequence of topics in an introductory statistics course. Each chapter has the following structure:

- Summary of Statistical Objectives
- Problem Statement

The problem statement section of each chapter describes the business situation which led to the collection of the data.

- **Characteristics of the data set**
This section of each chapter explains the details of the particular data set including information such as the filename, the name and column location of the variables, size of the file, etc.
- **Tutorials**
The next few sections of each chapter give the instructions for how to use Minitab to accomplish the particular statistical concept. Examples are provided using the data set for that chapter.
- **Investigative Exercises**
These exercises are designed to allow you to analyze the data set using the specific tools explained in the chapter. There is space provided for you to either paste in printed output from Minitab or to write in the answers by hand based on the screen display from Minitab.

The exercises are highly structured in the early chapters leading you to a directed analysis of the data set. You will always be asked to draw conclusions and make recommendations on the basis of your analysis.

As the chapters progress, it is expected that you will become increasingly familiar with the sorts of questions that should be asked, the types of calculations which might be informative and the types of comparisons which should be examined.

Section 1.5 How to Use the Workbook

This workbook is designed to be used by the students taking an introductory course in statistics. It is assumed that the student has been presented the traditional lecture material for each of the concepts prior to working with the corresponding chapter of the workbook.

The workbook chapters could be assigned as homework on an individual basis or to teams of students. Alternatively, the workbook chapters could be used during class lab sessions.

Chapter 2 The Basics of Windows

Section 2.1 Overview

This chapter will review some of the basic features of the Windows Operating System. It is not designed to be a comprehensive introduction to Windows and only covers those features of Windows that are essential for using Minitab for Windows and this workbook. It assumes that you are familiar with the use of a mouse and that Windows is installed and *currently running* on the computer you are using.

Section 2.2 The Windows Desktop

When Windows is open the screen you see is called the *desktop*. This is where the tools needed for using Windows and running your applications (software packages) are located. Each tool or application is represented by a small symbol called an *icon*. The applications and icons are grouped together in *program groups*. Each program group opens up as a window.

The main portion of the desktop is the *Program Manager*. Usually, when Windows is running the Program Manager is open and the Program Manager *window* is displayed. A *window* is a rectangular area of the screen usually dedicated to a particular set of tasks. The Program Manager window contains all of the basic tools for Windows as well as the icons for any applications that are installed on the system. Figure 2.1 shows the Program Manager window with another window (the **Main** window) open within it. The terms that have been defined as well as several others are illustrated in the figure.

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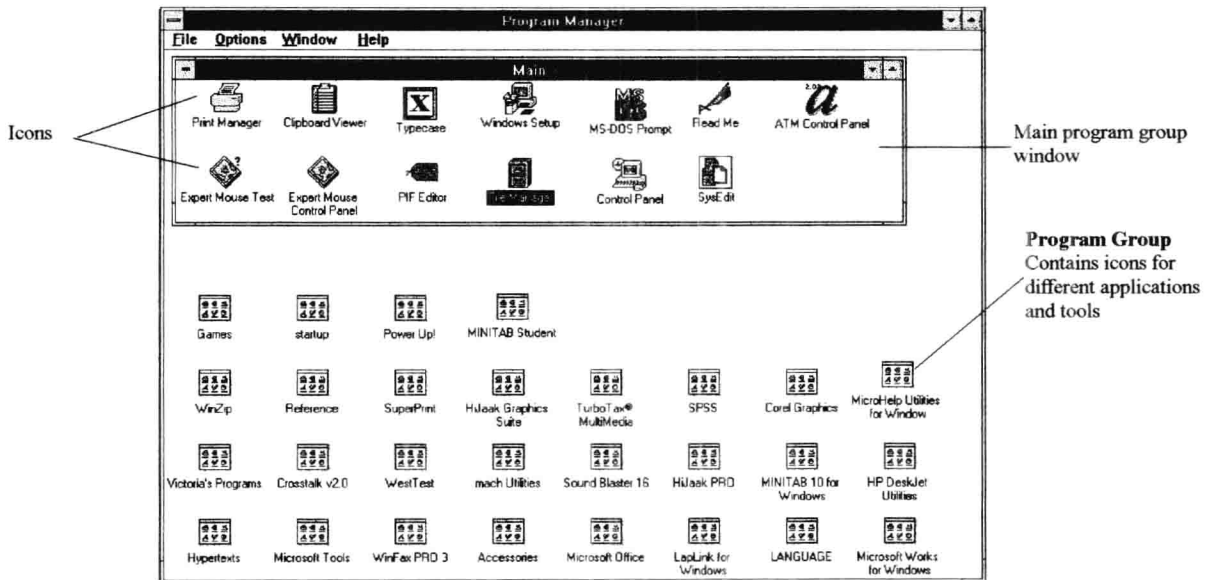


Figure 2.1 The Windows Desktop

Depending on the system you use, your desktop may not look exactly like the one shown. It may have fewer or different program groups and different windows might be opened. Generally the setup should be similar to the one in Figure 2.1.

Section 2.3 Parts of a Window

In order to use Windows effectively there are certain features that you should know about. A basic window is shown in Figure 2.2. The important features are illustrated and explained in the figure. To learn more about these features consult your Windows documentation.

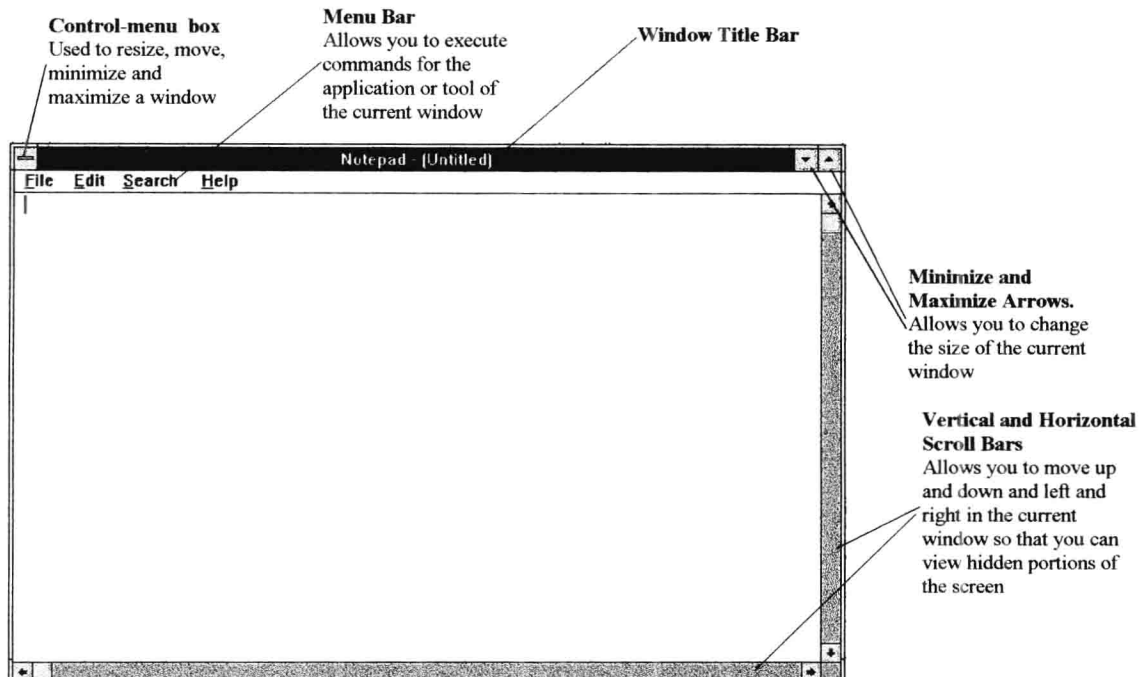


Figure 2.2 Parts of a Window

It is possible to have more than one window open at a single time. The **active window** is the one you are currently working in. Its title bar is typically a different color from the title bars of the other open window. To make another window the active one, you can either click on any portion of that window or use the **Window** menu from the main application tool bar.

Section 2.4 Other Windows Features

This section of the chapter will illustrate some of the other Windows features that you will encounter in Minitab.

Section 2.4.1 The Menu

Every application or tool in Windows has a **menu bar**. You use this menu bar to execute commands for the application or tool you are running. To access a menu you can either click on the menu title from the menu bar or use a combination of the **ALT** key and a letter. The letter you use is the one that is underlined in the menu choice.