2.2 Minitab, Data Entry, Statistics and Plots

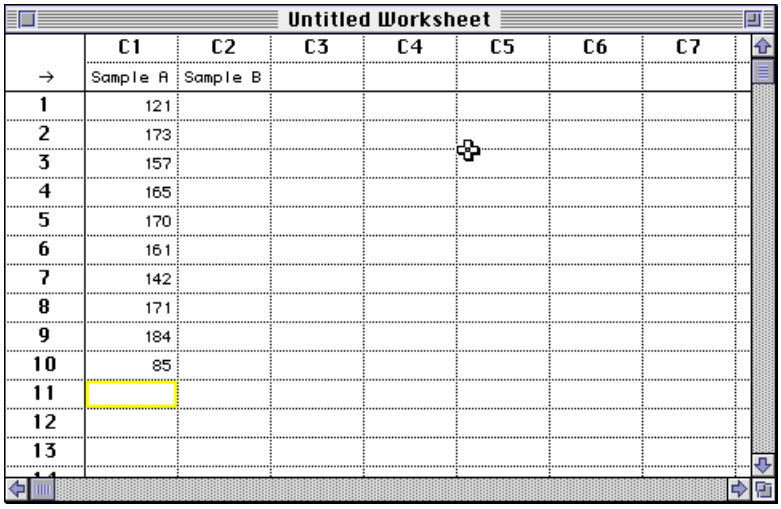
Purpose: Learn how to enter data into a Minitab worksheet, correct data entry errors, save Minitab worksheets, generate descriptive statistics, and generate box plots.

Reading Assignment: Read through Section 2.8.

Problem Description: Use Minitab to do textbook Exercises 2.98 (page 83) and 2.103(pages 84-85).

Generate output for exercise 2.98 (page 83): Read the exercise in the textbook. Log onto your Novell account. Double-click on the "Start Minitab.MTB" icon. This will bring up an empty Minitab worksheet.

Entering data into a Minitab worksheet via the Data window: The first way we will learn to enter data into a Minitab worksheet is by typing it directly into the Data window. To do so, make sure Minitab is active and the Data window is on top; (i.e. Click in the Data window, or select "Window -> Data"). Using the arrow keys and the return key to move around, type the names "Sample A" and "Sample B" for C1 and C2, respectively, and begin entering the data from the book as shown below.



	C1	C2	C3	C4	C5	C6	C7
→	Sample A	Sample B					
1	121						
2	173						
3	157						
4	165						
5	170						
6	161						
7	142						
8	171						
9	184						
10	85						
11							
12							
13							

Data Window Conventions: Data can be entered row by row or column by column, using the conventions tabled below. For example, after entering a number in a cell, pressing the "tab" key "enters" the value and moves you to the next cell to the right. Holding down the "_" key while pressing the "tab" key "enters the value and moves you to the first cell in the next row.

Type this:	To enter the value and:
"tab"	Move one cell to the right
"_" + "tab"	Start the next row
"return"	Move down one cell
"_" + "return"	Start the next column

Or **just** use the four "arrow" keys to move and then enter the values. Finish entering the data for Exercise 2.98. Beware, each entry, including the last one, is not entered until you move to another cell of the spreadsheet.

Saving a Minitab Worksheet: Once data is entered, you can save it so you will not have to reenter the data if it is needed at a future data. To do so, select "File -> Save Worksheet", type an appropriate name (e.g. "Lab 2.2 data") in the "Save worksheet as" box, then select "Save". This creates the file "Lab 2.2 data.MTW" on your Novell account. The file name extension ".MTW" indicates that it is a Minitab Worksheet.

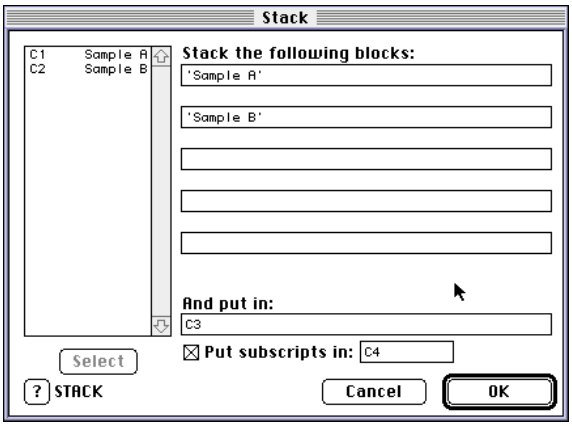
(You could then open this worksheet when in Minitab by selecting "File -> Open Worksheet". Also, if Minitab had not yet been started, you could double-click on the icon for this file to start Minitab with this worksheet of data.)

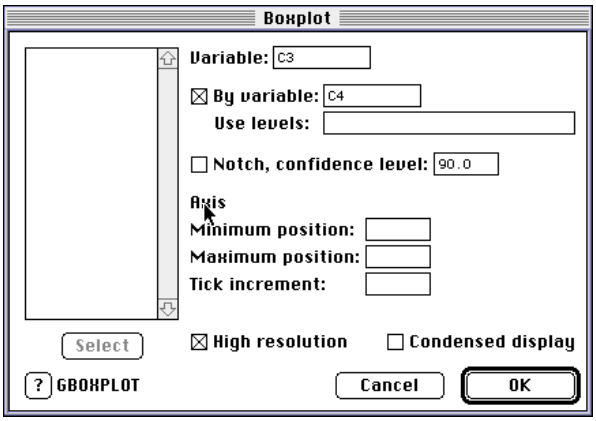
Printing data in your Session Window: If a worksheet is **not** too big, you may want to print its contents in the Session window. One column of data prints across rows, saving paper. Two or more rows print as columns. To see this, in Minitab select "Edit -> Display Data...", select only Sample A to be displayed, and select OK. Then repeat this but selecting both Sample A and Sample B. (What commands were generated in the Session window?)

Descriptive Statistics: Generate descriptive statistics for the data in columns c1 and c2 of the worksheet which provide you the general information about the data set, such as mean, median, etc. To do this using the menus, select "Stat -> Basic Statistics -> Descriptive Statistics..." then select both columns. (Alternatively, one could issue the Minitab command "describe C1 C2", or "desc C1 C2" -- only the first four letters of any Minitab command are needed.)

Boxplots: To generate boxplots for each variable, select "Graph -> Boxplot..." then one variable or column. Leave the box "High resolution" checked if you want high-resolution graphs. Repeat this for the other column. (The corresponding Minitab commands are "Boxplot C1" and "Boxplot C2".)

Boxplots on the same scale: Plots are more easily compared if they are on the same scale. To generate boxplots on the same scale, the data must be stacked into a single column, with subscripts in another column to identify which values came from the same column or sample. To do this, select "Calc -> Stack...", complete the dialog box as shown below left, and select OK. Then select "Graph -> Boxplot...", complete the dialog box as shown below right, and select OK.





(After looking at the resulting graph, look in the Session window to see what commands generated the results. Also look at the Data window to see how columns C1 and C2 were stacked into C3, with subscripts placed into C4. What do the subscripts in C4 indicate?)

Wrapping up Exercise 2.98. This completes Exercise 2.98. Save your worksheet (select "File -> Save Worksheet"). This will replace the file "Lab 2.2 data" saved previously with the current worksheet.

Generate output for Exercise 2.103 (pages 84-85):

Entering data using the Set command: While you can always enter data directly into the Data window, sometimes it's more convenient to use the Session window. The **Set** command is convenient for entering data one column at a time, because it lets you enter many numbers on each line. For Exercise 2.103, we only need to enter the data for the variable "Downtime". To do this, make the Minitab Session window active, make sure the cursor is at the Minitab prompt "MTB >" at the end of the session (pressing the "return" key while in the Session window gets you there), then enter the following lines after the prompts supplied by Minitab. You get the "DATA>" prompt whenever Minitab expects data. Press "return" after each line.

```
MTB > Name c5 'Downtime'
MTB > Set c5
DATA> 12 16  5 16 21 29 38 14 47  0 24 15 13  8
DATA>  2 11 22 17 31 10  4 10 15  7 20  9 22
DATA> 18 28 19 34 26 17 11 64 19 18 24 49 50
DATA> end
```

Fixing data entry errors: If you make any data entry errors, an easy way to fix them is to bring up the Data window, where you can fix errors in single cells or use the **Editor** menu to insert or delete rows or cells.

Save the worksheet: Enter the command: MTB > save 'Lab 2.2 data'
You will receive the message: "Worksheet saved into file: Lab 2.2 data"

Exercise 2.103ab: Use Minitab to generate a boxplot of and descriptive statistics for the Downtimes.

Exercise 2.103c: Use Minitab to compute the z-score for each Downtime. In the Minitab Session window, enter the following commands, but **replace** "xbar" and "s" in the second command with the values of the sample mean and sample standard deviation, respectively, just **obtained** as descriptive statistics.

```
MTB  > name c6 'z'
MTB  > let c6 = (c5-xbar)/s   # replace "xbar" and "s" with values!
MTB  > print c5
MTB  > print c6
```

Save and print the results: You now have the information needed for Exercises 2.98 and 2.103, but you need to save and print it. So, open your Word document "STT 264 template" (select "'your diskette' -> STT 264 template"), copy the Minitab Session window and any high-resolution graphs into the bottom of the Word document, save the Word document as "Lab 2.2 report", and print a copy for each lab partner.

LAB REPORT: **For this lab report, submit solutions to Exercises 2.98 and 2.103, with the Minitab output appended and annotated. Cross-reference the output in your solutions as appropriate. Your solutions to the exercises should be written out in detail.**