

Introduction to Minitab
Workshop Outline and Handout with Exercises
(last revised: 1/21/10)

What is Minitab?

- Minitab is a program that is used for easy statistical analysis of data
- It utilizes a spreadsheet concept with columns and rows
- Available on PC only

Where to find Minitab?

- Available on all PCs in all General Access computer labs on campus
- Minitab makes a trial version (30 days) available from their Web site at www.Minitab.com
- Minitab can also be rented for 6 months (\$30), 12 months (\$50) or purchased (perpetual academic license) for \$100. Visit their Website: www.Minitab.com

General Overview of Minitab:

- Minitab opens two windows , which are *Session* and *Worksheet* windows
 1. Session Window: used to manually enter commands and display non-graphical output such as tables and output from the statistical routines in Minitab.
Menu commands within *Session* Window:
 - File Open and save worksheets and projects , save worksheet to file space, print output from worksheet, retrieve recently used files
Example: saving to file space: Click *File > Save Project As > Browse to My Documents > Save*
 - Edit Cut, copy and/or paste output in session window or another document
 - Data Manipulate rows, columns and/or variables.
Includes *Unstack Columns, Sort, Code, Rank* command and more.
 - Calc Calculate mathematical expressions, set patterned data.
Includes *Make Indicator Variables* command and more.
 - Stat Perform various statistical functions.
Includes *Basic Statistics, Regression, ANOVA* and many more.
 - Graph Create various graphs.
Includes *Histogram, Stem & Leaf Plot, Boxplot, Pie Chart* and many more.
 - Editor Where to find the *Enable Commands* option. (Note: you must click on the session window first to activate this)
 - Tools Includes access to the Microsoft Calculator.
 - Window This contains the Project Manager where the naming option is located.
 - Help Contains online information on Minitab commands.
Includes *Tutorials* on Minitab.

2. Worksheet Window: The spreadsheet of the program and contains the data to be analyzed. Data is entered into rows or columns of the spreadsheet.

Exercises for students:

Data Creation:

A) Ways to enter original data:

1. Within Minitab, there are a few ways in which data can be entered into the worksheet. Minitab has commands called SET and READ that can be used (see specifics of these commands under the **Help** menu option on the toolbar). The most common method, though, is entering the data directly into the worksheet much like Excel.
2. Note that each column in the worksheet is pre-labeled C1, C2, etc. You can add your own label in the 2nd row by clicking on the cell and entering your label.

B) Example: Enter data in spreadsheet so that the spreadsheet contains the column labels and data as indicated below.

C1	C2	C3	C4
Region	Revenues	Expenses	Profit
1	40	27	
2	42	26	
3	45	32	
4	39	30	
5	43	25	
6	46	36	

Data Transformation:

A) Data manipulation:

1. If data needs to be modified or manipulated before being further analyzed, there are two ways of doing the manipulation. The first way is to use the LET command which takes on the general format:

Let (column) =(arithmetic expression)

Example: Let C4=C2 – C3

Note: In order to enter commands like this via Minitab, you must first turn on this feature in the Minitab software. To do this, click on the session window and select **Enable Commands** under the **Editor** menu option. This will provide a MTB>

prompt in the session window where you can now enter the LET command. Since column labels have been added in our example, a 2nd option that can be used would be:

Example: Let Profit = Revenues – Expenses

2. The calculator within Minitab can also be used to manipulate the data. Under the **Calc** on the toolbar, select the **Calculator** and use this feature to manipulate the data.

B) Example: Find the profit for the above chart.

Analytical Tools:

A) Graphical analysis: Create a pie chart using the variable Profit.

Under the **Graph** toolbar option, select the **Pie Chart** option.

Note that there are several plot and chart options available under **Graph** including **Scatterplot, Stem & Leaf, Histogram, Bar Chart and Time Series**. Once a specific Tool has been selected a 2nd window will open and prompt you for additional information.

Example: Using the data from the above example, select the “Chart values from table” option and specify the “category” variable (Region) and “summary” variable (Profit). Note other options, e.g., labels, etc., available. Use “Labels” option to create a pie chart relevant to the Revenue-Expense data above by specifying a title for the chart and placing labels on the pie slices.

B) Recoding data and reporting summary: At times a research project may require transforming original data into another form for further reporting or analysis. Here’s an example.

Exercise: Generate grades, A B C D F, from set of test scores.

Enter test scores into C8: 97 85 78 65 53 91 68 82 71

Use the **Code** command under the **Data** toolbar menu and convert the test scores to letter grades using A: 90-100, B:80:89; C:70-79; D:60-69 and F:0-59. Put the letter grades in C9. Then, use the **Tally** command to get a distribution of the letter grades (e.g., **Tally C9**). The Tally command is found by selecting the **Stat** toolbar option and then selecting **Tables**. The first option under **Tables** is **Tally Individual Variables**. Select that option and identify the variable to be tallied. Note the display options available for the report.

C) Descriptive Statistics and Comparative Analysis Using Analysis of Variance (ANOVA) and T-tests: Comparative analysis is a common research method in which data from two or more groups are compared. The most common statistical tools here are the Analysis of Variance (ANOVA) and T-test.

Exercise: Generate basic statistics for a set of test scores and compare the results of three groups of students. Enter the data as shown below into the Minitab worksheet (i.e., test scores in C1 and group number in C2).

<u>Student</u>	<u>Test Score</u>	<u>Group</u>	<u>Student</u>	<u>Test Score</u>	<u>Group</u>
1	37	1	9	35	2
2	34	1	10	48	2
3	35	1	11	31	3
4	32	1	12	31	3
5	39	1	13	28	3
6	45	2	14	30	3
7	39	2	15	26	3
8	41	2	16	34	3

1. Analyze data by using the **ANOVA** option under the **Stat** menu heading. Then, select the **Oneway analysis (stacked)**. Enter the test scores for Response variable and group for the Factor variable. Click OK.
2. The ANOVA can also be used when the data is not stacked. Select the **Data** option on the main toolbar and using the **Unstack Columns** option, unstack the test scores and put them in different columns in the same spreadsheet. Use the group codes from the data as the subscripts. Select the option to store unstacked data in columns *after the last column in use*. Three new columns, C4, C5 and C6, will be created containing the data from the 3 different groups. Click OK.
3. Data in unstacked format can be used via ANOVA, too. Using the reformatted data from the unstacking process above (C4, C5 and C6), let's re-run the ANOVA analysis only this time use the unstacked data. Select the **Stat** option and then **ANOVA** again, only this time select the **Oneway (Unstacked)** option. Specify the 3 columns containing the data as the Response variables. Click OK. Note that there are optional *Comparisons* and *Graphs* that can be made if desired.
4. You can also use the T-test statistic to compare 2 different groups and only 2 groups at a time. On the toolbar menu, select **Stat**. Then select **Basic Statistics**. Finally

select **2-Sample T-test**. There are 2 ways of running a 2-Sample T-test depending on how the data is formatted and the number of groups to compare. In our example, we have 3 groups forcing us to use the unstacked data. Select the option identifying that the data is stored in different columns and then enter the specific columns containing the data for which you want to make comparisons. To compare these 3 groups, you would have run 3 different t-tests: group 1 versus group 2, group 1 versus group 3 and finally group 2 versus group 3.

Note that had there been only 2 groups, the stacked version of the data could have been used to run the t-test.

Copying and saving files:

1. To copy Minitab output to another application such as Microsoft Word document for text editing:
 - Open up a new Word document and Minitab
 - Copy and paste the session window's contents to Word document.
2. Save (Save File) worksheet to your file space.

Analyzing Data Previously Stored (e.g., CIS 242 classes):

It is possible to previously enter data in Minitab and store the data in Minitab format. This is useful in classes for students to use or large research projects which require extensive analysis.

Example: The authors of the textbook used in CIS 242 (Business Statistics) make available electronically the datasets used in the textbook so that the students do not have to key in the data for each problem. These datasets are stored on an SCSU server and made available to students in the class. This is just one example of how to access previously stored data. From the Huskynet home page, select the **Software** option and then the **Academic Data Sets**. Notice the 3 different folders referenced here. Select and open the folder labeled **Main Datasets Folder (Top Level)**. Open the folder called "BCIS242DataSets" and then open the folder called "Minitab". The files in this folder contains all of the datasets referenced in the recent textbooks used in CIS 242. Merely open the dataset needed and a copy of Minitab will open the project containing the related data from the problem.

Exercise: Using the steps previously identified above, locate and open the **Main DataSets Folder (Top Level)**. Then open the folder called "StatsWorkshops" and the file called LIGHTBULBS. Use the scrollbar to go to the top of the *Session* window. Read the information and instructions in the Session window to complete this exercise.