

# Minitab Introduction. (for Minitab 17) rev 1\_20

This exercise is adapted from a tutorial previously available on the Minitab website ([http://www.minitab.com/resources/tutorial/Meet\\_MINITAB/session1/index.htm](http://www.minitab.com/resources/tutorial/Meet_MINITAB/session1/index.htm)) for Minitab 12. It has been adapted for use with Minitab 17.

## The story

Clones are genetically identical cells descended from the same individual. Researchers have identified a single poplar clone that yields fast-growing, hardy trees. These trees may one day be an alternative energy resource to conventional fuel.

Researchers at The Pennsylvania State University planted Poplar Clone 252 on two different sites—one, a site by a creek with rich, well-drained soil; the other, a site on a ridge with dry, sandy soil. They measured the diameter in centimeters, height in meters, and dry weight of the wood in kilograms of a sample of three-year-old trees. These researchers want to see if they can predict how much a tree weighs from its diameter and height measurements. Congratulations! You have been hired as data analyst for the project, and you will be performing the statistical analysis.

In this session you will learn how to:

- open a worksheet
- enter and edit data
- save data
- compute some basic statistics
- do arithmetic
- plot the data
- compute a correlation coefficient
- edit and add comments to the output
- print and save your results

## Step 1: Start Minitab

The way you start Minitab depends on which operating system you are using.

The start up screen will contain two windows

**Session** - will display text output such as tables of statistics

**Worksheet** - is your **data** window here you will enter, edit and view the column data for each worksheet. Each data set that you work with in a project is contained in a worksheet. You can have many worksheets in one project.

## Step 2: Open a Worksheet

When you start Minitab, you begin with a new, empty project. You can add data to your project in many ways, but the most common way is to open a worksheet. Note that you are only copying the data from the worksheet to the project; any changes that you make to the data added to your project will not affect the original file.

In this session, you will use the file POPLAR1.MTW..

1. Choose **File > Open Worksheet**.
2. Make sure the file type is Minitab (\*.mtw) and the current subdirectory is DATA.
3. Click on POPLAR1.MTW and click **Open**.
4. If the Data window is not already visible, open it to view the columns in your worksheet:  
choose **Window > POPLAR1.MTW** or press **Ctrl+B**.

This worksheet contains three variables, labeled Diameter, Height, and Weight. Each variable contains 15 observations—all the data collected so far.

### Step 3: Enter Data from the Keyboard

The worksheet POPLAR1 contained the data collected so far, but you just received new observations from the field, and there are five new rows to enter.

1. Press **↓** until you reach the first blank cell in row 16 or, with your mouse, click on the first blank cell in row 16.
2. Type the following from left to right across each row:

1.52	<b>↵</b>	2.9	<b>↵</b>	.07	<b>Ctrl</b>	<b>↵</b>
4.51	<b>↵</b>	5.27	<b>↵</b>	.79	<b>Ctrl</b>	<b>↵</b>
1.18	<b>↵</b>	2.2	<b>↵</b>	.03	<b>Ctrl</b>	<b>↵</b>
3.17	<b>↵</b>	4.93	<b>↵</b>	.44	<b>Ctrl</b>	<b>↵</b>
3.33	<b>↵</b>	4.89	<b>↵</b>	.52	<b>Ctrl</b>	<b>↵</b>

**Tip:** To make entries going down a row, click the data direction arrow (upper left hand corner of worksheet, above the row numbers) to make it point down. If you want to go across a row entering data, you click it to make it point down.

### Step 4: Enter Patterned Data

You can always type data in the Data window, but if your data follow a pattern, there is an easier way to enter your data.

You now want to create a new variable that will indicate whether an observation was taken from the site with rich, well-drained soil (1), or from the site with dry, sandy soil (2). This new variable, called Site, will contain ten 1's followed by ten 2's.

1. Choose **Calc > Make Patterned Data > Simple Set of Numbers**.
2. To store the new data: in **Store patterned data in**, type **Site**. Minitab will automatically assign this new variable to the first empty column—in this case, C4.

3. To indicate the beginning and end of the sequence: in **From first value**, type **1**; **In To last value**, type **2**.
4. Since you want ten 1's and ten 2's, in **Number of times to list each value**, type **10**. Then click **OK**.

The new Site column appears in the [Data](#) windows.

## Step 5: Save Your Project

It is a good idea to save your work frequently. Now is probably a good time to save, since you have just entered new data.

1. Choose **File > Save Project**.
2. In **File name**, enter **POPLAR1** for the name of your project. If you omit the extension .MPJ, Minitab will automatically add it once you save the document.
3. Click **Save**.
4. If you see a message box asking if you want to replace an existing file, click **Yes**.

## Step 6: Compute Descriptive Statistics

Minitab offers a wide array of basic statistics to help you analyze your data, such as descriptive statistics, t-tests, z-tests, and correlations. You decide to produce a separate summary table for the trees at each site describing the three variables Diameter, Height, and Weight.

1. Choose **Stat > Basic Statistics > Display Descriptive Statistics**.
2. In the variable list box, click **Diameter** and drag the mouse so that you highlight **Diameter**, **Height**, and **Weight**. Then click **Select**.
3. In the By variables box, enter **Site**. (You can type it in, or place your cursor in the box, then double click on site in the left had box.

Checking By variable tells Minitab to generate separate statistics for Diameter, Height, and Weight for each level of the variable Site.

**Note** When you select a series of columns, Minitab uses a dash to abbreviate the series. In this example, Diameter—Weight means the variable Diameter, Height, and Weight.

4. Click **Graphs**.
5. Check **Boxplot of data** and click **OK**
6. The click **OK** again to perform the requested actions.

Minitab displays text output in the Session window and each graph (three, in this case) in its own Graph window

Judging from the boxplots, Site 2 is producing larger trees than Site 1. The Session window output contains the details: all three variables show larger means and medians at Site 2. Also, the variable Weight has a very large standard deviation relative to its size. At Site 2, the minimum weight is only 0.03 kg while the maximum is 1.11 kg. It appears that some of our poplars are doing very well, while others are barely alive.

## Step 7: Perform Arithmetic

Now on to the task of predicting how much the trees weigh. Based on previous work, the researchers have found that the weight of a tree is closely related to the square of diameter multiplied by height. Since you have diameter and height data, you can calculate this new variable using Minitab's calculator. The calculator performs the equation you enter and puts the result in the variable you specify.

1. Choose **Calc > Calculator**.
2. You decide to call the new variable "D2H" for diameter squared times height. In **Store result in variable**, type **D2H**.
3. In **Expression**, type **C1^2\*C2**. Click **OK**. Verify [dialog box](#).

This expression tells Minitab to square the variable Diameter (C1), multiply by the variable Height (C2), and put the result in a new variable called D2H.

**Tip:** *You could also use the mouse to create the equation: (1) select **Diameter** from the variable list, (2) click the **^**, **2**, and **\*** buttons on the calculator, and (3) select **Height** from the variable list.*

The Data window shows the new variable D2H that you just created. Now save the project changes.

4. Choose **File > Save Project**, or press **Ctrl+S**.

## Step 8: Create a Scatter Plot

The researchers have determined that there is a relationship between weight and this variable called D2H. You want to see if your poplars' data exhibit this relationship as well by plotting Weight by D2H on a scatter plot:

1. Choose **Graph > Scatter Plot**
2. Select **Simple** and click **OK**.
3. In **Y variables** (the vertical axis), enter **Weight**. (or with the cursor in the Y box, double click on Weight.)
4. In **X variables** (the horizontal axis), enter **D2H** and click **OK**.

Looking at the scatter plot, you see a positive linear relationship between Weight and D2H. That is, as D2H increases, so does Weight. You also notice an unusual data point—a tree that has a very low weight for a relatively high D2H value. For now, you decide to ignore it, but it is something you may want to check on later. Next, you will compute the correlation between these two variables to quantify the relationship.

## Step 9: Compute a Correlation Coefficient

From the scatter plot, you have seen that as D2H increases, so does Weight. Now you want to measure the association between these two variables by computing a correlation coefficient. The correlation coefficient measures the linear relationship between two variables and assumes a value between -1 and +1.

1. Choose **Stat > Basic Statistics > Correlation**.
2. In **Variables**, enter **Weight** and **D2H**. Click **OK**. Verify [dialog box](#).

## Step 10: Edit the Session Window Output

It is time to create a report of your results: the text results, such as the summary descriptive statistics you computed; and the graphs, such as the scatter plot.

First you will edit the text output in the Session window to make it more appropriate for a report. You can edit text in Minitab's Session window similar to the way you can edit with a word processor, even finding and replacing text and changing fonts.

By default, the Session window is read-only, so that you cannot accidentally delete results. To begin editing, you will have to make the Session window editable:

1. Press **Ctrl+M** to make the Session window active.
2. Pull down the **Editor** menu. Verify [Editor menu](#).
3. There is a menu item that displays a check mark that works like a toggle: it reads **Output Editable**:
  - If the item reads **Output Editable** with **NO** check mark, click it.
  - If the item reads **Output Editable** with a check mark, do not do anything. You can click outside the menu to cancel it.

Now you can edit your output.

4. Delete all the text above the Descriptive Statistics output and all the text between the Descriptive Statistics output and the Correlation output. Select the text by dragging over it with your mouse, then delete it by choosing **Edit > Cut** or pressing **Delete**.
5. Scroll to the top of the [Session window](#) and type four comment lines as shown below:  
Original data set was POPLAR1.MTW  
Five lines of data were added.  
Two variables were added. Site and D2H = (Diameter\*\*2)\* Height.  
The resulting data set was stored in the project POPLAR.MPJ.

6. Save your work. Choose **File > Save Project**.

The Session window is ready to print.

## Step 11: Print Your Work

To print the contents of any window, switch to that window, then choose **File > Print [xx]**.

Depending on which window is active, that window name will appear after **Print**. You will first print your output from the Session window, and then your graphs from the Graph windows.

1. Choose **File > Print Session Window**, then click **OK**. Since you are in the Session window, that is what will be printed.

You could go to each Graph window and print them separately, but if you have more than one graph there is a faster way.

2. Choose **Window > Project Manager**. Verify [dialog box](#).
3. Choose the **Graphs** folder.
4. Select the four graphs you have created: click on **Boxplots of Diameter** and, while holding the Shift key, select **Scatterplot of Weight vs D2H**.
5. Choose **File > Print Selected Graphs**.
6. Choose either **Print on separate pages** or **Print on the same page** based on personal preference and select **OK**.

## Step 12: Save Your Work

When you save your project, you save all your work at once: all the data, all the output in the Session window, and all the open Graph windows. When you reopen the project, all that information will be waiting for you, right where you left it.

1. Choose **File > Save Project**.

**More** If you want to use output or data in another application or another Minitab project, you can save your Session window output, data, and graphs as separate files. These separate files are copies of what is currently in your project—the contents of your project are not changed in any way.

## Step 13: Exit Minitab

If you want to take a break before continuing to another session, you can exit Minitab.

1. Choose **File > Exit**.
2. Minitab may ask if you want to save changes to your project. Since you already saved your project above, there is no need to do it again here. Click **No**.