

Samples from: **MINITAB Book**

Quality and Six Sigma Tools using MINITAB Statistical Software: A complete Guide to Six Sigma DMAIC Tools using MINITAB®

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One of the major objectives of this text is to teach quality, data analysis and statistical tools used in the Six Sigma DMAIC (Define, Measure, Analyze, Improve, and Control) process. The chapters in this book provide concepts, understanding, and computer applications of Six Sigma DMAIC tools. The statistical tools used in the DMAIC process are discussed with step-wise MINITAB computer applications.

The following are samples from the book randomly selected from different chapters

CHAPTER 1 Introduction to MINITAB Statistical Software: Getting Started with MINITAB

Chapter Highlights

This chapter deals with the details of MINITAB statistical software used widely in Six Sigma. After completing this chapter, you will become familiar with MINITAB and its major features. The following topics are discussed in this chapter:

- 1. Introduction to Minitab and getting started with the software*
- 2. The main features of the software, and how to perform data analysis using Minitab*
- 3. Entering data, data types, data formats, and analyzing data*
- 4. Graphing and editing data using the features such as: Scale, Labels, Data View, Multiple Graphs, and Data Options to edit graphs*
- 5. The descriptive and statistical analysis tools for Six Sigma using Minitab*
- 6. Simple to advanced analysis tools in Minitab*
- 7. An interactive session and a tutorial to learn Minitab*

MINITAB Statistical Software: An Overview

OUTLINE: CHAPTER 1

- Objectives and Overview
- MINITAB Statistical Software: An Overview
- Worksheet (Data Window)
- Session Window
- History Window
- Analyzing Your Data
- Graphing Your Data: Scale, Labels, Data View, Multiple Graphs, Data Options
- Printing and Saving Your Work
- Command Sequence Used In This Text
- Preparing Your Report
- Changing data from Numeric to Text or Text to Numeric
- Editing Your Graphs and Plots
- An Interactive Session with MINITAB

Sample pages from Chapter 1

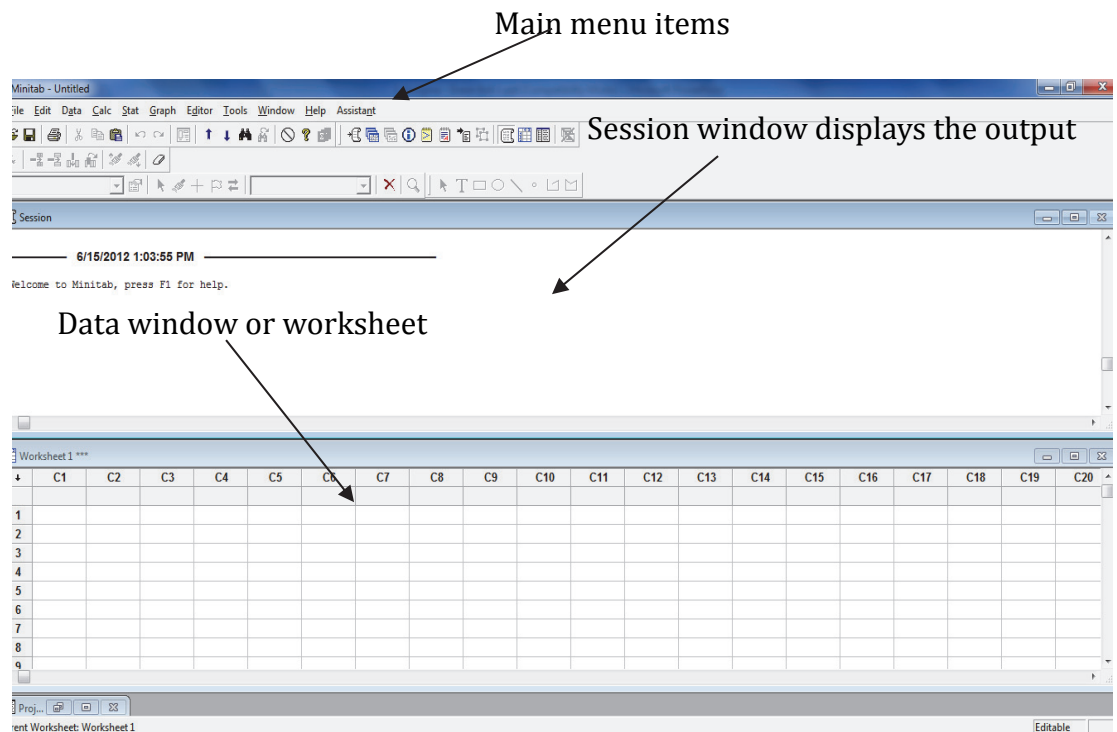


Figure 2.1: The Session and the Data Window

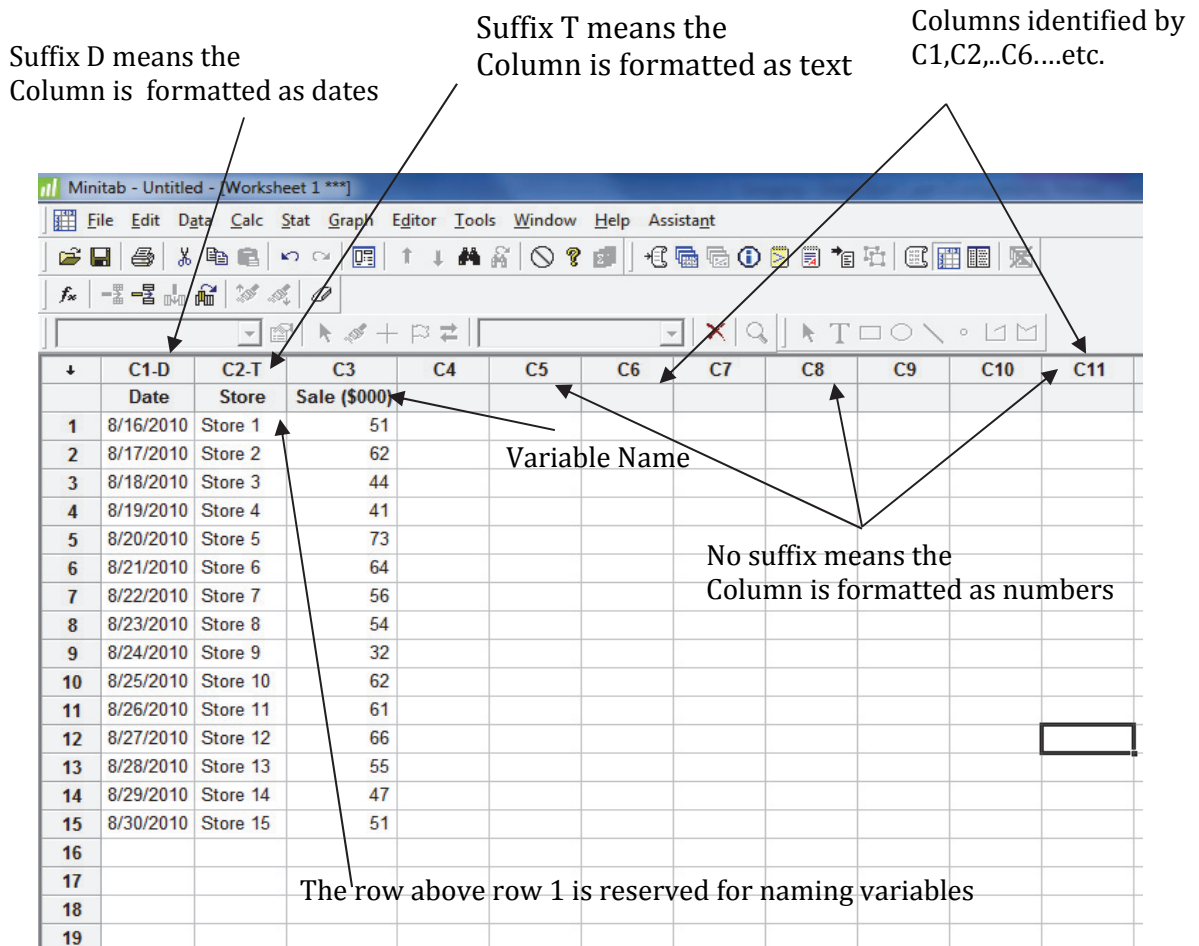


Figure 2.4: Different Types of Data in MINITAB Work Sheet

Tutorial

1. Start MINITAB Using the Following Command Sequence

Start >Programs >MINITAB (or double click on the MINITAB icon)

(Note: the instructions in this chapter are for MINITAB release 16 but most commands will also work with MINITAB 15, the previous release).

2. Enter the Data in MINITAB Worksheet

Table 2.1 shows the number of orders received by a company for the past 50 weeks. This data is also available in data file: **ORDERS.MTW** but you may enter the data in the MINITAB worksheet. To enter the data manually, label column C1 of the MINITAB worksheet with **No. of Orders** and enter the 50 values in this column. You may enter the values in any order (row or column wise) but make sure all 50 values are in one

column (C1). You may enter only part of data if you wish or open the file **ORDERS.MTW** from the data files.

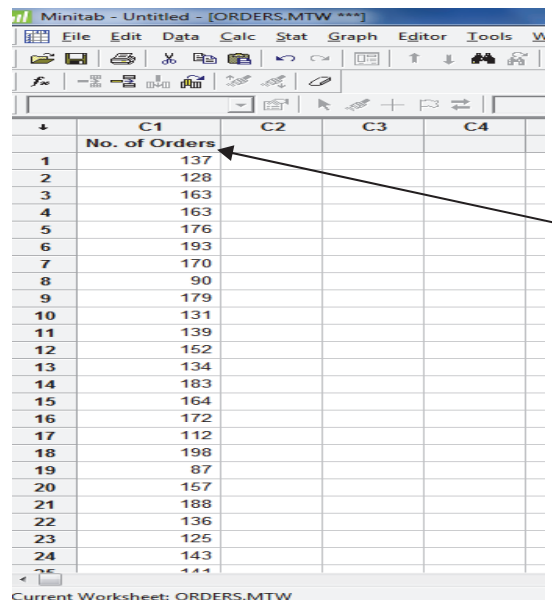
Table 2.1

Number of Orders for the past 50 weeks												
No. of Orders												
137	183	133	142	128	164	125	94	163	172	160	170	163
112	138											
141	163											

Figure 2.9 shows part of the data file or the worksheet. Once the data are entered, use the command sequence

File > Save Current Worksheet as

Name the file **ORDERS** and save it. MINITAB puts an extension .MTW to all the data files.

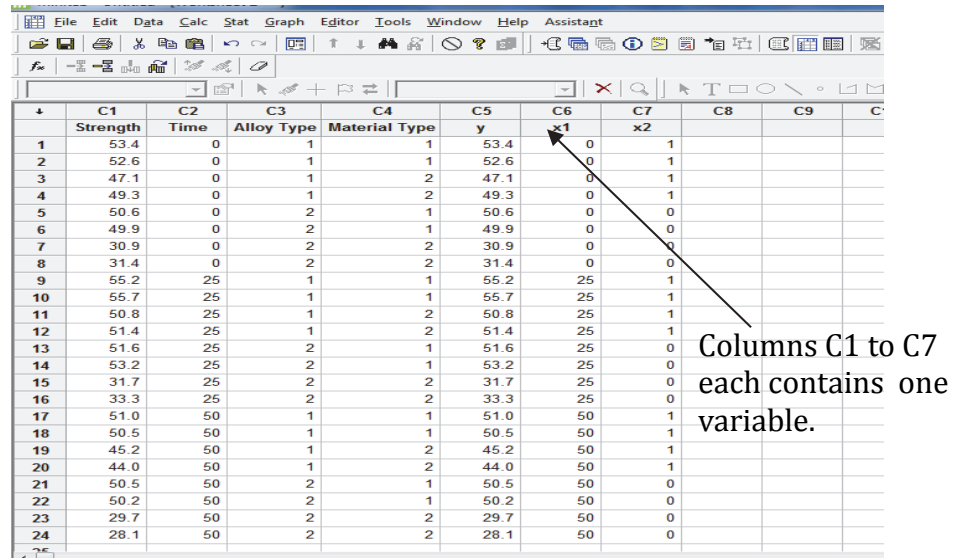


Label column C1 as shown and enter the 50 values in this column

Figure 2.9: Part of the Data File or Worksheet in MINITAB

3. Entering the Data in MINITAB Worksheet – Another Example

:
:
:



	C1	C2	C3	C4	C5	C6	C7	C8	C9
	Strength	Time	Alloy Type	Material Type	y	x1	x2		
1	53.4	0	1	1	53.4	0	1		
2	52.6	0	1	1	52.6	0	1		
3	47.1	0	1	2	47.1	0	1		
4	49.3	0	1	2	49.3	0	1		
5	50.6	0	2	1	50.6	0	0		
6	49.9	0	2	1	49.9	0	0		
7	30.9	0	2	2	30.9	0	0		
8	31.4	0	2	2	31.4	0	0		
9	55.2	25	1	1	55.2	25	1		
10	55.7	25	1	1	55.7	25	1		
11	50.8	25	1	2	50.8	25	1		
12	51.4	25	1	2	51.4	25	1		
13	51.6	25	2	1	51.6	25	0		
14	53.2	25	2	1	53.2	25	0		
15	31.7	25	2	2	31.7	25	0		
16	33.3	25	2	2	33.3	25	0		
17	51.0	50	1	1	51.0	50	1		
18	50.5	50	1	1	50.5	50	1		
19	45.2	50	1	2	45.2	50	1		
20	44.0	50	1	2	44.0	50	1		
21	50.5	50	2	1	50.5	50	0		
22	50.2	50	2	1	50.2	50	0		
23	29.7	50	2	2	29.7	50	0		
24	28.1	50	2	2	28.1	50	0		

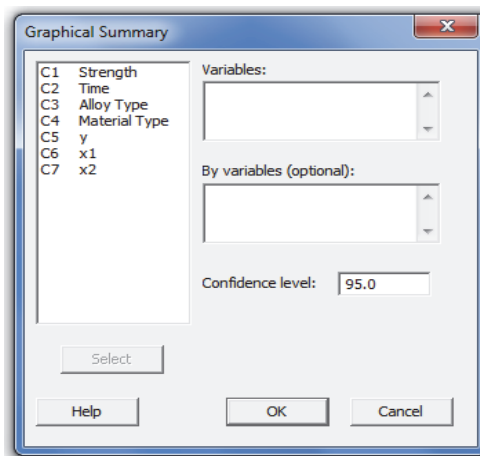
Figure 2.10: Entering Data – Each Column Containing One Variable

4. Selecting Variable(s) for Analysis

Selecting a menu item for analysis from the main menu will display a dialog box showing the list of variables...

Stat > Graphical Summary

will show the dialog box shown in figure below. The variable or variables for analysis are then selected from this list.



Refer to figure above. Suppose we want ‘Graphical Summary’ of the variable ‘Strength.’ Double click on this variable from the list of variables from the left side and it will appear under the “Variables” box (see Figure 2.13). If you want the ‘Graphical Summary’ of more than one variable, highlight all the variables from the variables list using your mouse pointer then click the “Select” button at the bottom of the variables list. Figure 2.14 shows how to select more than one variable for analysis.

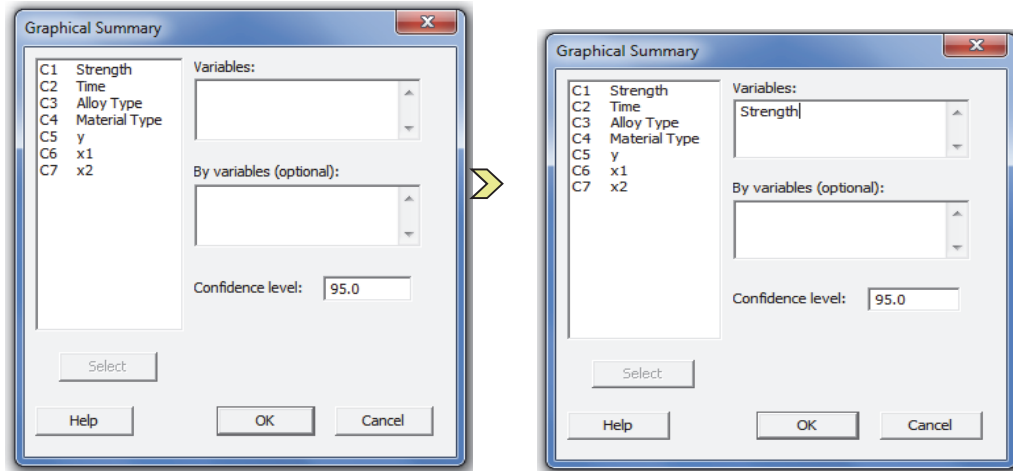


Figure 2.13: Selecting a Variable for Analysis

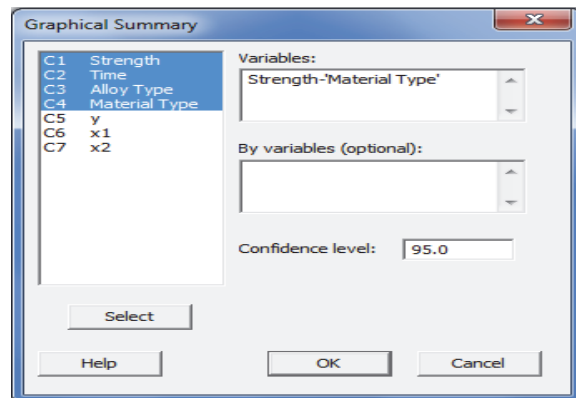


Figure 2.14: Selecting Multiple Variables for Analysis

5. Sort the Data

Open the worksheet **ORDERS.MTW**

Data > Sort

To complete the **Sort** dialog box that is displayed; double click on **C1 No. of Orders** from the box on the left side of the dialog box that displays the list of all variables, the column they are

6. Generate Patterned Data in the Worksheet (generating a sequence of numbers)

:
:

Calc > Make Patterned Data > Simple Set of Numbers

Complete the **Simple Set of Numbers** dialog box by typing the following response

From first value **1**
To last value **50**

In steps of	1
List each value	...
List the whole sequence

Click **OK** and the numbers 1 through 50 will be stored in column **C3** of the worksheet. Label this column **Week**.

7. Generate Random Data

You can also generate random data from various distributions. For example, to generate 100 random numbers from a normal distribution, use the following command sequence:

Calc > Random Data > Normal

Complete the **Normal Distribution dialog** box by typing the following response

:
:
:

Click **OK** and 100 random numbers from normal distribution with mean 50 and standard deviation 5 will be generated and stored in column C4 of the worksheet. Name this column **Random Numbers**.

8.

9. Doing a Simple Analysis

.... Assuming the data file **ORDERS.MTW** is open with column C1 of the data file with number of orders for 50 weeks. To calculate the descriptive statistics for this data, follow the command sequence below

Stat > Basic Statistics > Display Descriptive Statistics

In the **Display Descriptive Statistics** dialog box, type **C1** or double click **C1 No. of Orders** from the list of variables from the left side then click on the **Statistics** tab. The dialog box in Figure 2.16 will be displayed.

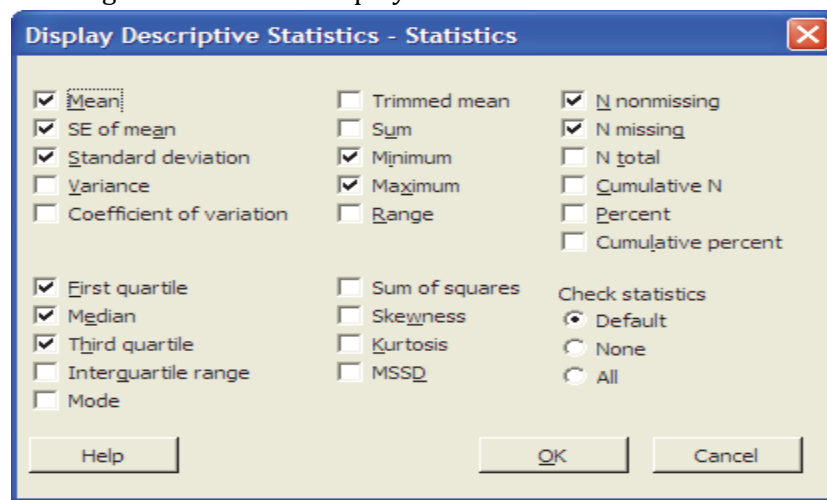


Figure 2.16: Descriptive Statistics Dialog Box

.....You may select additional statistics and then click **OK**. You will be back to **Display Descriptive Statistics** dialog box. Click **OK** and the selected statistics will be calculated and displayed on the Session window as shown in Table 2.2.

Table 2.2

Descriptive Statistics: No. of Orders										
Variable	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3	
No. of Orders	50	0	144.52	4.10	29.02	81.00	130.25	142.50	164.75	
Variable	Maximum									
No. of Orders	198.00									

You can also construct simple graphs of your data by clicking on **Graphs** tab under **Display Descriptive Statistics** dialog box. To do the graphs, use the following command sequence:

Stat > Basic Statistics > Display Descriptive Statistics

In the **Display Descriptive Statistics** dialog box, double click on **No. of Orders** on the left

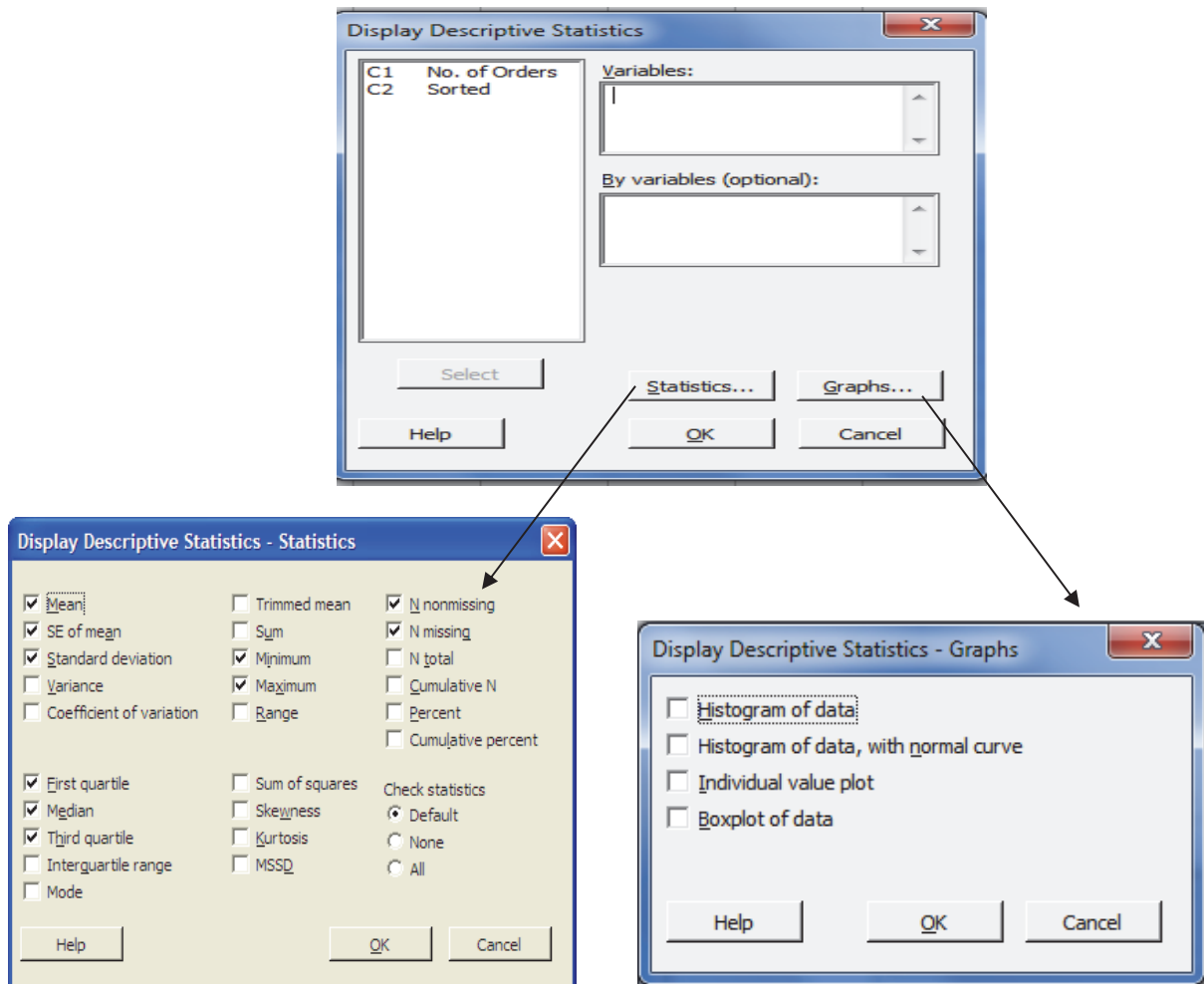


Figure 2.17: Selecting Statistics and Graphs

10. Constructing Graphs using Graph Menu Command

You can construct a variety of graphs and charts using the **Graph** command. We have explained here how you can do a stem-and-leaf plot, a scatter plot and a time series plot.

(a) Construct a Stem-and-leaf plot of No. of Orders (stored in column C1): From the main menu, select the command sequence:

Graph > Stem-and-leaf

In the **Stem-and-leaf** dialog box, select, **C1 No. of Orders** or ...then click **OK**. The stem-and-leaf plot shown in Figure 2.18 will be displayed.

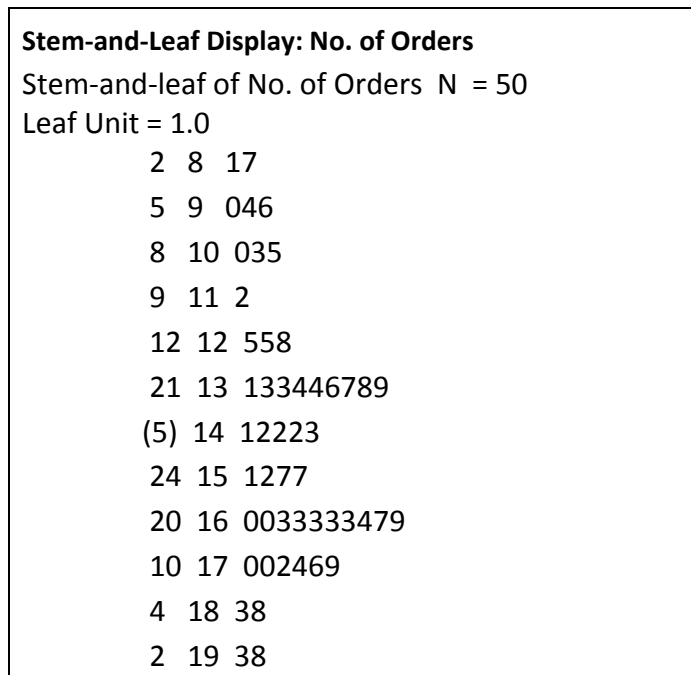


Figure 2.18: Stem-and-leaf Plot

(b) Construct a Scatter Plot: Select the command sequence

Graph > Scatterplot

In the scatterplots dialog box, select **Simple** then click **OK**. **Scatterplot-simple** dialog box will be displayed. Type or select **No. of Orders** for **Y variables** and **Week** for **...variables**. Click **OK**. The scatter plot (shown below) of number of orders for 50 weeks will be shown on the graphics window (Figure 2.19).

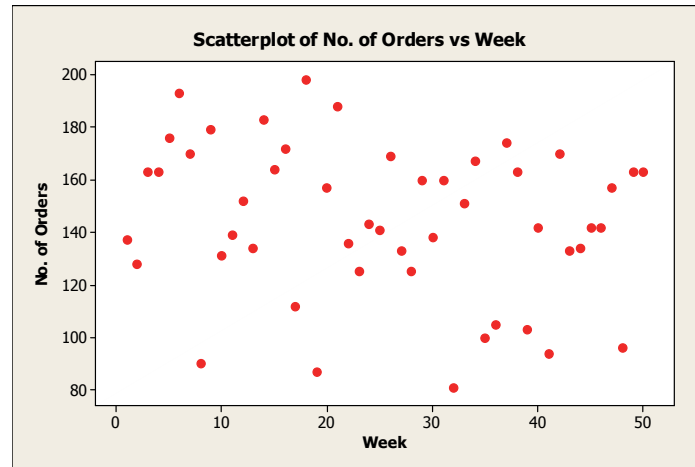


Figure 2.19: Scatterplot of Number of Orders

(c) Construct a Time Series Plot

A time series plot displays data over time. Suppose we want to construct a time series plot of number of orders for the past 50 weeks. Select the command sequence

Graph > Time Series Plot

In the **Time Series Plot** dialog box, click on **Simple**



Figure 2.20: A Time-Series Plot of Number of Orders

11. Saving Your Work

By now you should have data in four columns C1, C2, C3, and C4 of the worksheet. You can save your work using

File > Save Current Worksheet as *continued...*