



Practical Session: Using Minitab

Instructions

1. Read through the section “About Minitab”, and follow the instructions for “Logging onto Windows 2000” and “Accessing Minitab”.
 2. Work through all of the questions.
 3. This practical is not assessed – however, working through all the questions here should equip you with the skills to use Minitab in the first assignment, should you choose to do so.
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About Minitab

Minitab is an easy-to-use statistical package which can carry out a wide variety of statistical tasks. You may use Minitab in many different courses during your time as a student, for many different purposes, so it is worth putting a little effort into familiarising yourself with the basics at an early stage. That way, you will be able to adapt to more sophisticated uses of the package later on in your course. There are three basic kinds of object Minitab works with:

Data column: This is the most frequently used object type in Minitab. Columns are denoted C1, C2, C3 etc. They each store a collection of observations relating to a particular variable.

Constants: These are denoted K1, K2, K3 etc., and each stores a single number of interest.

Data arrays: These are matrices of numbers, and are denoted by M1, M2, M3 etc.

All of the data columns, constants and data arrays relating to a particular problem are stored in a working environment called a **Worksheet**. Worksheets can be saved to and loaded from disk, for later use. Several worksheets may be opened simultaneously, and these can be saved together as a **Project**. Minitab will display results from any numerical analysis in the **Session** window (top half of the screen).

Minitab has both a command language and a menu driven interface. This module will concentrate on the latter, which is more intuitive, especially for the beginner. The easiest way to see Minitab in action is to work through this practical and the exercises within.

Getting started

Logging on to Windows 2000

Before you can use Minitab, you must log into the Windows 2000 system. Sit down at a workstation and make sure the monitor is turned on. Press **Ctrl-Alt Delete** to bring up the logon box. Click with the mouse on the box marked **User name** and enter your user name. This is a bit like your Student ID – but not exactly. In particular, your user name will probably begin with n or a, whereas your Student ID will begin with a digit. Next click on the box marked **Password**, and enter your password. This is something you chose yourself when you registered, unless you have changed it. Next click on the button marked **OK**, in order to log onto the network. As the login proceeds, you will be presented with some information about the ISS system, which you should **Dismiss**. You should now be presented with your Windows desktop, ready for use.

Accessing Minitab

Minitab is loaded by selecting **Start – Programs – Statistical Software – Minitab 15 for Windows – Minitab 15**. This should load the Minitab application, which may take a few seconds.

You should now have a spreadsheet (“data window”) ready to input data. In Minitab, there are two main windows; the **Session** window and the **Worksheet** window. The Worksheet allows you to view and edit the data columns of the current worksheet. It is normally empty on startup, so the first step is to load the data in. Always enter data in the white boxes – the grey boxes are for column titles. Use the arrow keys to move around the worksheet.

You can copy-and-paste any of the graphs you produce in the following questions by right-clicking on the graph in Minitab, selecting **copy**, and then, for example, selecting **paste** in a word-processing application such as Microsoft Word.

1. The observations in the table below are the recorded time it takes to get through to an operator at a telephone call centre (in seconds).

54	56	50	67	55	38	49	45	39	50
45	51	47	53	29	42	44	61	51	50
30	39	65	54	44	54	72	65	58	62

These data were presented to you in Lecture 2, and you should have drawn a stem-and-leaf plot to represent them on page 15 in the lecture notes. Let us now use Minitab to produce this plot.

Enter the data in the table above in column C1 of the Minitab worksheet. To do this, point the cursor at the first cell in column C1 and click. Then type in the number 54, move to the cell underneath using the down arrow key, type in the number 56, and so on, until all 30 observations have been entered. Once you have done this, you should give the column a title. To do this, point and click the cursor over the grey box at the top of the column, and type in a suitable title (e.g. “time in seconds”).

From the taskbar, click on **Graph – Stem and Leaf**, and in the **Graph Variables** box type C1 (because this is the column where your data are). Click OK.

The stem and leaf plot should appear in the Session window – check to make sure.

Look at the stem and leaf plot. What comments could you make on the distribution of the call centre data? How does this plot differ to that drawn in the lecture? Can you work out what Minitab does differently?

2. Also presented to you in Lectures 1 and 2 were the data on students’ modes of transport – these are shown again below:

Mode	Frequency
Car	10
Walk	7
Bike	4
Bus	4
Metro	4
Train	1

Open a fresh Minitab worksheet by clicking on **File – New – Minitab Worksheet – OK**. Enter the data in the table above into columns C1 and C2 of the new worksheet, i.e. enter the modes of transport into column C1 and the corresponding frequencies into column C2. Don’t forget to give each column a title in the grey box (i.e. “mode” and “frequency”). Notice that column C1 is now called C1-T; this is because Minitab has recognised that this is a **Text** column.

Click on **Graph – Bar Chart**. Because you have entered the data into Minitab in a tabular form (i.e. the frequency table, and not the raw data, have been entered), in the **Bars represent** box click the down arrow and select **Values from a table**, and click OK.

In the Graph Variables box type C2, because column C2 actually contains your data. In the Categorical variable box type C1, because this column contains the categories. Click OK. After a few seconds a bar chart of these data should appear.

Double click on the title of the bar chart. When the Edit title box appears, change the title of this chart to something more appropriate.

Now double click on one of the bars in the chart. In Attributes click on Custom and click on the down arrow next to Background color. Choose a colour you like and then click OK. This will change the colour of the bars in the chart. In the same way, you can change the colour of individual bars.

Why are there gaps between the bars in you bar chart?

3. Open Internet Explorer and go to the MAS1403/ACE2013 website (www.mas.ncl.ac.uk/~nlf8) and then click on MAS1403). Scroll down to the lecture notes section, and next to Chapter 7 you will see two links to some datasets. Click on the link for the Farmer's Market Data; a file will open which shows the amounts, in £, spent by 200 customers at a farmer's market stall in the Lake District. In Internet Explorer, click on Edit - Select All, and then Edit - Copy.

Now go back to Minitab and open a fresh worksheet in exactly the same way you did in question 2. Point and click the cursor on C1, which should highlight the entire column. Click on Edit - Paste Cells; doing so should now enter the Farmer's Market Data into the first column of your new Minitab worksheet.

- (a) Produce a histogram for the Farmer's Market Data by clicking on Graph - Histogram - Simple - OK. Type C1 in the Graph Variables box and click on OK. After a few seconds, Minitab will display a histogram for the Farmer's Market Data.
- (b) Change the colour of the bars in your histogram. Change the title to something more appropriate, and change the label of the x-axis to "Amount spent in pounds".
- (c) Now double click on any one of the bars. When the Edit Bars box opens, click on Binning, and in the Interval Definition change the Number of intervals to 80 and click OK.
- (d) Repeat the steps in part (c), but this time change the Number of intervals to 5.
- (e) Repeat the steps in part (a) to produce the original histogram again. Now double click on any of the numbers on the frequency axis; an Edit Scale box should open. Click on Type, select Percent, and click OK. What is the name of the graph now produced?

What is wrong with the histograms produced in parts (c) and (d)? Why might we prefer to use the type of graph produced in part (e)?

4. Go back to the course website and follow the steps in question 3 to load the "Jeans Sales Data" into Minitab. These data are the estimated monthly sales of pairs of Levi's jeans, in thousands, over a six year period in the U.K. (Jan 2000 - Dec 2005 inclusive).

Produce a time series plot of these data by clicking on Graph - Time Series Plot - Simple - OK. Enter C1 in the Series box.

Now click on Time/Scale, select Calendar and from the drop-down menu select Month Year. In the Start Values boxes enter 1 for Month and 2000 for Year (i.e. January 2000), and click OK twice.

After a few seconds Minitab will produce a time series plot for the Jeans Sales Data.

Look at the time series plot. Can you see any trends? Are there any outliers?

5. Open a fresh Minitab worksheet and re-load the Farmer's market data you used in question 3. We will now see how to use Minitab to produce numerical summaries of data in line with the work we covered in Chapter 4 of the lecture notes.

Click on Stat - Basic Statistics - Display Descriptive Statistics, enter C1 in the Variables box and click OK. Minitab will give lots of numerical summaries in the Session window - we're not interested in all of them.

Use the Minitab output to help complete the following table:

Mean (\bar{x})	
Median	
Range	
Standard deviation (s)	
Inter-quartile range ($Q3 - Q1$)	

Use the numerical summaries provided by Minitab to sketch a box-and-whisker plot for these data by hand.

Now use Minitab to produce a box-and-whisker plot by clicking on Graph - Boxplot - Simple - OK. Enter C1 in the Graph Variables box and click OK.

How does the plot produced by Minitab differ from that you drew by hand?

Saving and retrieving worksheets and projects

When you have been using Minitab, you will often want to save the contents of your Worksheet for future use. To save a Worksheet, first click on it in order to make it active, and then select File - Save Current Worksheet As. Make sure that your current drive is H: (which appears as your user name) and give an appropriate name for the file before clicking on OK. On the Windows 2000 clusters, drive H: is synonymous with My Documents, so you may save your work in My Documents if you prefer - it makes no difference. Note that saving a Worksheet only saves the Worksheet contents. It does not save any plots you have produced, or the contents of the session window. To save your complete workspace, including the session window, all open worksheets, and any plots, select File - Save Project As and select an appropriate directory and file name. This can be reloaded at a later stage by selecting File - Open Project or by clicking on the small yellow "open file" icon on the Minitab toolbar. Projects are often more convenient than worksheets for a "project" you are working on. However, they are less useful for long term data storage, as the project files tend to be very large, and so you may eventually run out of disk storage space.

Exiting and logging out

When you are finished working with Minitab, it is important that you exit the program and then log out of the Windows 2000 network properly; this will ensure that all of your work is saved properly and that your files are not corrupted. To exit Minitab, select File - Exit. You will have an opportunity to save your project - you may wish to save this to your H: drive, which is your own personal file space, and will be available to you whichever machine you use, on any Windows 2000 cluster.

Once you have exited Minitab, you can log out of the cluster by selecting Start - Log off a????? (where a????? is your user name), and then clicking on Yes. Don't do this until the end of your practical session!