
In these labs you should work through the problems on the sheet and type your answers into a Microsoft Word document. When you have completed the tasks, print the document and hand it in.

Your answers can benefit from having small sections of R output and graphs copied and pasted into your word document. It can be useful to limit the width of output produced by R so that it fits into your document. You can change the width of output produced by R with a command like: `options(width=50)`.

The labs will count for 1 mark in the current assignment. They will be graded on a 0-1 basis. Don't forget to put your name and student ID on the document.

1. It is possible to print R plots directly to the printer by selecting the Print item under the File menu. In practise it is more useful to be able to embed the graphs in a Word (or other) document.
 - (a) There are two ways to copy graphs from the R graphics window for pasting into a document. The shortcuts which do the copying are `~C` (Ctrl-C) and `~W` (Ctrl-W). What is the difference between the two methods and which do you think is preferable? (Hint: Look under the file menu for the two copy methods).
 - (b) It is possible to change the size of an R graphics window by dragging the lower right corner of the window to a new position. In practise, it is hard to use this method to get a precisely-sized graphics window. A useful alternative is to create a new graphics window of a particular size. You can do this by issuing an R command of the form:

```
windows(width=wid,height=hgt)
```

where *wid* and *hgt* are the width and height (in inches) that the window is to be created with. What are reasonable choices for *wid* and *hgt*? (the ratio of *hgt* to *wid* is largely a matter of taste, but values in the range 0.65 to 0.75 look fairly good). Use the command `plot(1:10)` to produce a plot with your choices.

- (c) The default text size used by Word is 10pt. The default text size for R plots looks rather larger than this. There are two reasons for this (i) the pointsize used by R is larger than 10pt and (ii) the Helvetica font that R uses appears larger than the Times font chosen by Word, even at the same pointsize.

You can override the default font size choice made by R with an argument of the form `pointsize=8` in the call to the `windows` function. Again, use the simple `plot` call above to see what happens to window layout.

2. In Meteorology (the study of the weather) a symbol called a *windrose* is used to show prevailing wind directions. The rose consists of line segments from a central point running out in the eight compass directions: E, NE, N, NW, W, SW, S, SE. The length of each line segment is equal to the percentage of time the wind spends blowing from that direction.

(a) If the values for Auckland are:

E	NE	N	NW	W	SW	S	SE
10	15	10	9	11	28	9	8

draw the wind-rose for Auckland. (Make the lines very thick, say `lwd=10` or `lwd=20`.)

(b) Write the actual values just beyond the ends of the lines.

(c) Add a title to the plot.

3. The current assignment requires that you understand how the R `legend` function works. You should carefully read the documentation for the `legend` function. You can do this by typing the R command

```
?legend
```

In particular, you should work out how to make the legend opaque by giving it a background colour.

Think about and ask questions about assignment 2.