

# Intro to R

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October 27 2017

# What is R?

R is a software language for carrying out complicated (and simple) statistical analyses

It includes routines for -

- Data summary and exploration

- Graphical presentation

- Data modelling

# What's needed to use R?

R is a freeware system

RStudio makes R easier to use. It includes a code editor, debugging and visualization tools

Go to the website

Download R: <https://cran.cnr.berkeley.edu/>

Download RStudio:  
<https://www.rstudio.com/products/rstudio/download/>

# Basics of R

1. Objects and Arithmetic
2. Summaries and Subscripting
3. Matrices
4. Attaching to objects
5. The apply function
6. Statistical computation and Simulation
7. Graphics
8. Writing functions
9. Other things...

# 1. Objects and Arithmetic

R stores information and operates on objects

The simplest objects are -

Scalars, Vectors and Matrices

There are many others -

Lists and Data frames

## 2. Summaries and Subscripting

Built-in functions

mean

var

summary

# 3. Matrices

Combination of rows and columns

## 4. Attaching to objects

R includes a number of datasets that it is convenient to use for examples

A more effective way . . .

R has a function dedicated to reading comma-separated files



## 5. The apply function

It is possible to write loops in R, but they are best avoided whenever possible

A common situation is where we want to apply the same function to every row or column of a matrix

The function apply simplifies things

Any function can be applied in this way

## 6. Statistical Computation and Simulation

Many of the tedious statistical computations can be easily carried out in R

This can be useful for finding confidence intervals etc.

R enables simulation from a wide range of distributions

## 8. Graphics

R has many facilities for producing high quality graphics

There are also many optional arguments in most plotting functions that can be used to control colours, plotting characters, axis labels, titles etc.

To print a graph, point the cursor over the graphics window and press the right button on the mouse. This should open up a menu which includes 'print' as an option. You also have the option to save the figure in various formats, for example as a postscript file, for storage and later use.

# 9. Writing functions

An important feature of R is the facility to extend the language by writing your own functions

The template

```
function () {  
  
}
```

can be used to insert the body of your function. Note that the braces enable several lines of commands to be included in the function

## 10. Other things...

There are many other facilities in R. These include:

1. Functions for fitting statistical models such as linear and generalized linear models.
2. Functions for fitting curves to smooth data.
3. Functions for optimisation and equation solving.
4. Facilities to program using loops and conditional statements such as if and while.
5. Plotting routines to view 3-dimensional data.

## 10. Other things...

There is also the facility to 'bolt-on' additional libraries of functions that have a specific utility. Typing

```
> library()
```

will give a list and short description of the libraries available.

Typing

```
> library(libraryname)
```

where libraryname is the name of the required library will give you access to the functions in that library.

# Thank you

# Questions?

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