Introduction to R

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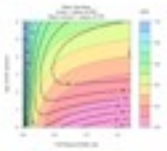

What is R?

"*A free programming language and software environment for statistical computing and graphics*"

- Manipulate data
- Statistical analysis
- Mathematical modeling, simulation
- Plot figures, animations
- Write scripts and functions for own analysis

Installing R and R-studio

Go to: http://mirrors.dotsrc.org/cran/

MS Windows - select "*base*" and "*Download R 3.0.1 for Windows*". This downloads the installer "*R-3.0.1-win.exe*". Run this to install the program.

Apple OSX 10.6 and later - Download the installer package "R-3.0.1.pkg" and double click it to install the program.

Installing R and R-studio

Go to: http://www.rstudio.com/ide/download

Click on: 

Click to download the recommended version.

Follow the instructions!

R Studio

R Studio

- Data entry in Excel
- Explore data in R to find errors
- Do analysis and exploration in R, not Excel
- Be lazy and use scripts (don't just type everything into the console!)
- Scripts: programs allowing you to repeat, edit, correct your work

The R language

Object oriented programming language

- Objects - numbers, variables
- Functions - manipulations of objects

The R language

Basic operations

- Arithmetic (`+, -, *, /, ^, sqrt`)
- Matrix maths (`t, *, %*%`)
- Assignment (=, <-)

Getting help (e.g. for the "`lm`" function).

- `?lm, ??lm`
- `help("lm"), help.search("lm")`

“Objects” in R

- Vectors and elements
- Data frames
- Lists
- Matrices

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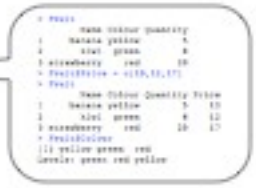

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"Classes" in R

- "**Class**" defines the type of object and can influence what functions do.
- Common classes

```
data.frame
list
matrix
integer
numeric
factor
character
```

Model objects: `lm`, `glm`, `aov` etc.

Importing data from Excel

- Create a folder/directory for analysis and set it to be R's working directory

```
setwd("PATH")
```

- Save Excel file out as a *.csv file
- Import using the `read.csv` function

```
A <- read.csv("PATH", header = TRUE)
```

Manipulating dataframes

- Subsetting data using logical operators (==, <, >, <=, >=)
- By row/column

```
x[1:5, ], x[ ,6:10]
```

- `subset` function

Export data from R

- Export using the `write.csv` function

```
write.csv(myData, file = "myData.csv", header
= TRUE, row.names = FALSE)
```

- This file can be opened in Excel
- Save the entire workspace

```
save.image("myWorkspace.RData")
```

- Save the parts of the workspace

```
save(A,B,C,"myWorkspace.RData")
```

Objects you want to save

Graphics in R