Introduction

Programming in R for Data Science

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A first session

```
> x<-rnorm(100)
> head(x)

[1] -0.2596588 -0.5439287 -0.3976459 -0.8051366 -0.8854298
[6] -0.1317834

> mean(x)

[1] 0.04613127

> sd(x)

[1] 1.013185

> min(x)

[1] -3.207916

> max(x)

[1] 2.550923
```

R as a calculator

Basic operations

```
> 2+2
[1] 4
> 7*17
[1] 119
> sqrt(9)
[1] 3
> 3^3
[1] 27
> log(7)
[1] 1.94591
> log10(7)
[1] 0.845098
```

Precision

```
> sin(pi/2)
[1] 1
> pi
[1] 3.141593
> options(digits=22)
> pi
[1] 3.1415926535897931
```

Infinity or not defined, and missings

```
> 1/0
[1] Inf
> 2*Inf
[1] Inf
> -1/0
[1] -Inf
> 0/0
[1] NaN
> c(1,2,3,NA,5)
[1]  1  2  3 NA  5
> mean(c(1,2,3,NA,5))
[1] NA
```

Assignments to variables

```
> x <- 5
> x
[1] 5
> # x=5 can be used; not recommended
> x*x
[1] 25
> y <- x+5
> ls()
[1] "x" "y"
> rm(x)
> ls()
[1] "y"
```

Getting help

Different sources

- The internal help functions
- Manuals
- Cheat sheets
- Mailing lists
- Google
- `http://stackoverflow.com/`
- Books
- Local **R** users

Internal help function

- If we know what function we need help with, then type:

```
> ?mean     # shorthand for help(mean)
```

- If we just want to see an example

```
> example(mean)
```

- Often we don't know exactly what we are looking for

```
> ??"fitting linear model"   # shorthand for
>                            # help.search("fitting linear model")
```

Manuals

- Available on-line `http://www.r-project.org`, but main ones are also part of the installation, type:

  `> help.start()`

- "An Introduction to R" and "R Data Import/Export" are worth looking at.

Cheat sheet

- May be useful to mount near you desk when starting with **R**
- Several can be found at `http://cran.r-project.org/other-docs.html`

Mailing lists

- **R** has an extremely active user base.
- The mailing lists are very helpful, you can access many at `https://www.r-project.org/mail.html`... but users prefer that you read and think before you pose questions.
- Also they easily smell if you are asking for an answer to a homework question.
- The archive is a goldmine of knowledge `http://tolstoy.newcastle.edu.au/R/`.

Do you know stack overflow?

- Main site at: `http://stackoverflow.com/`
- Find 'tags' and **R**
- The rating often gives you a high quality answer
- Example `http://stackoverflow.com/questions/9508518/why-are-these-numbers-not-equal`

Books

- There are many
- Here is a list of 150 **R** –books:
  `http://www.r-project.org/doc/bib/R-books.html`
- Most are fairly specialized

Local R users

- By far the optimal source of information.
- Not only are they close by, but on top of explanations, they may even provide you with a piece of code that nearly does the job.
- Remember this when someones comes to you for R help.