UNIVERSITÉ DU LUXEMBOURG

LUXEMBOURG INSTITUTE OF HEALTH
RESEARCH DEDICATED TO LIFE

PhD Course

Advanced Biostatistics

Lecture 1

Introduction to R

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Outline

- **Information package**
- **Installation**
- **R interface (L1.1)**
  - typing commands, calling functions, embedded help and demo
- **Variables and basic operations (L1.2)**
  - variables, types of data, scalar data, vectors, matrixes, data frames, lists.
- **Data import and export (L1.3)**
  - work folders, use scan, read/write tables, load/save data
- **Control workflow and custom functions (L1.4)**
  - if, while, repeat, next, break, custom functions, use external scripts
- **Data visualization (L1.5)**
  - variables, types of data, scalar data, vectors, matrixes, data frames, lists

L1. Information Package

Main Web-page:
cran.r-project.org

cran.r-project.org/manuals.html
cran.r-project.org/web/packages/
cran.r-project.org/other-docs.html

R/Bioconductor
www.bioconductor.org

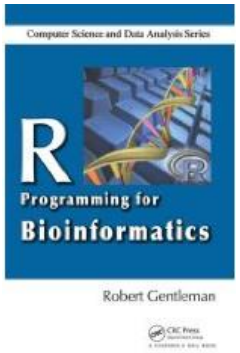
R-Project Seek Engine:
www.rseek.org

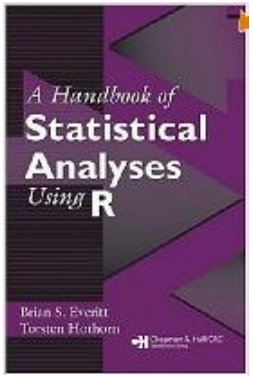
Advanced Biostatistics
edu.sablab.net/abs2016

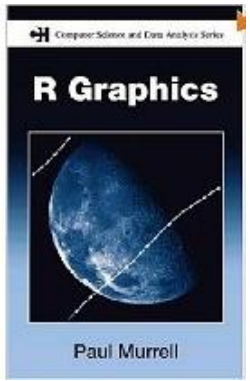
Scripts
edu.sablab.net/abs2016/scripts

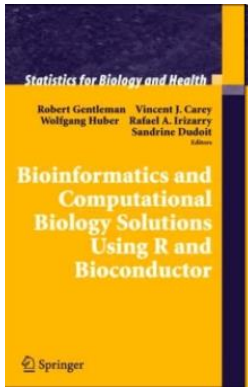
Data
edu.sablab.net/data/txt

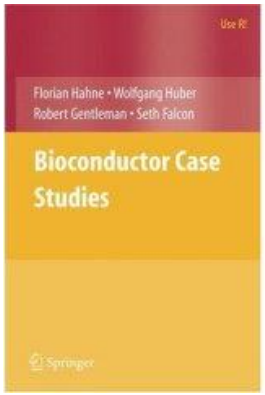
Other related courses
edu.sablab.net





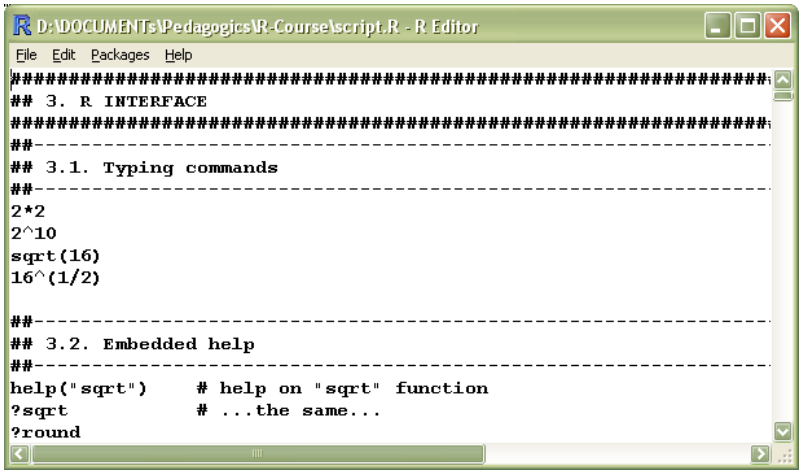




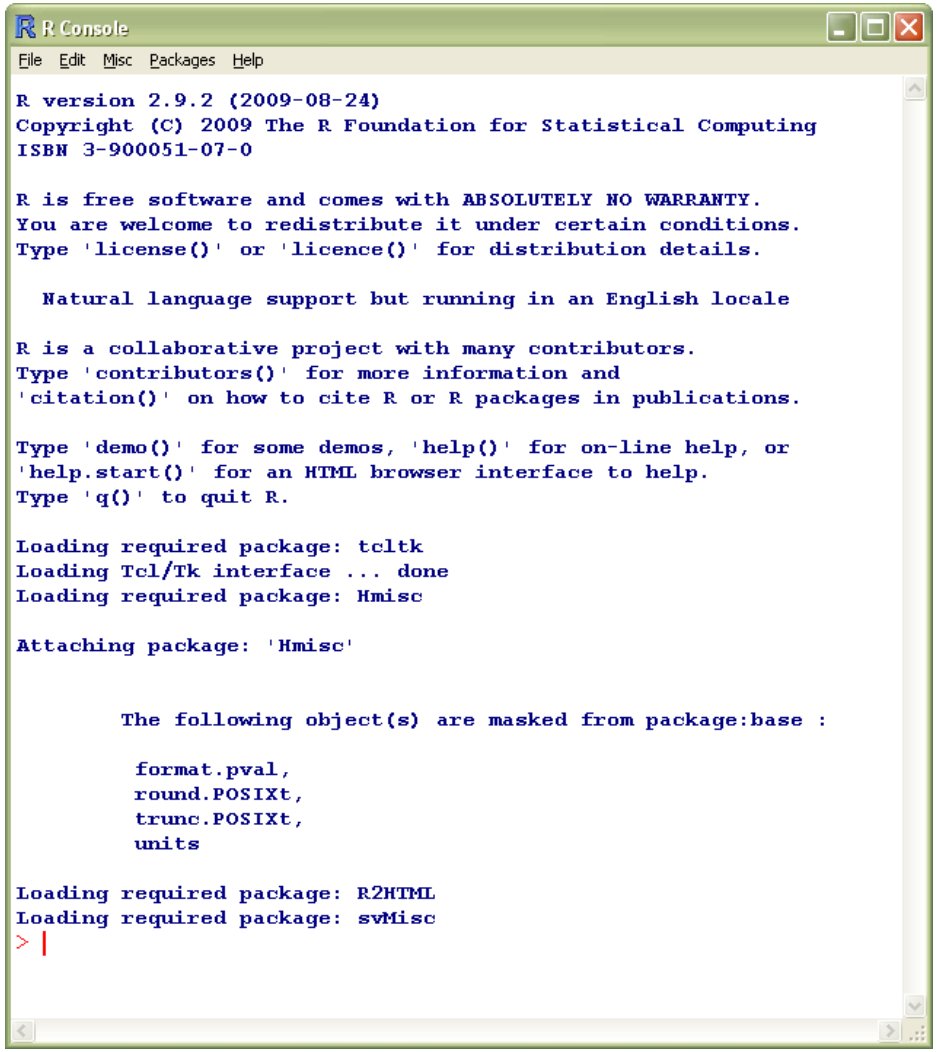


L1. R Interface

Built-in Script Editor



Console



Alternative Editors

RStudio (Win, Linux, McOS)
http://rstudio.com/

Notepad++ & NpptoR (Win)
http://notepad-plus-plus.org/
http://sourceforge.net/projects/npptor

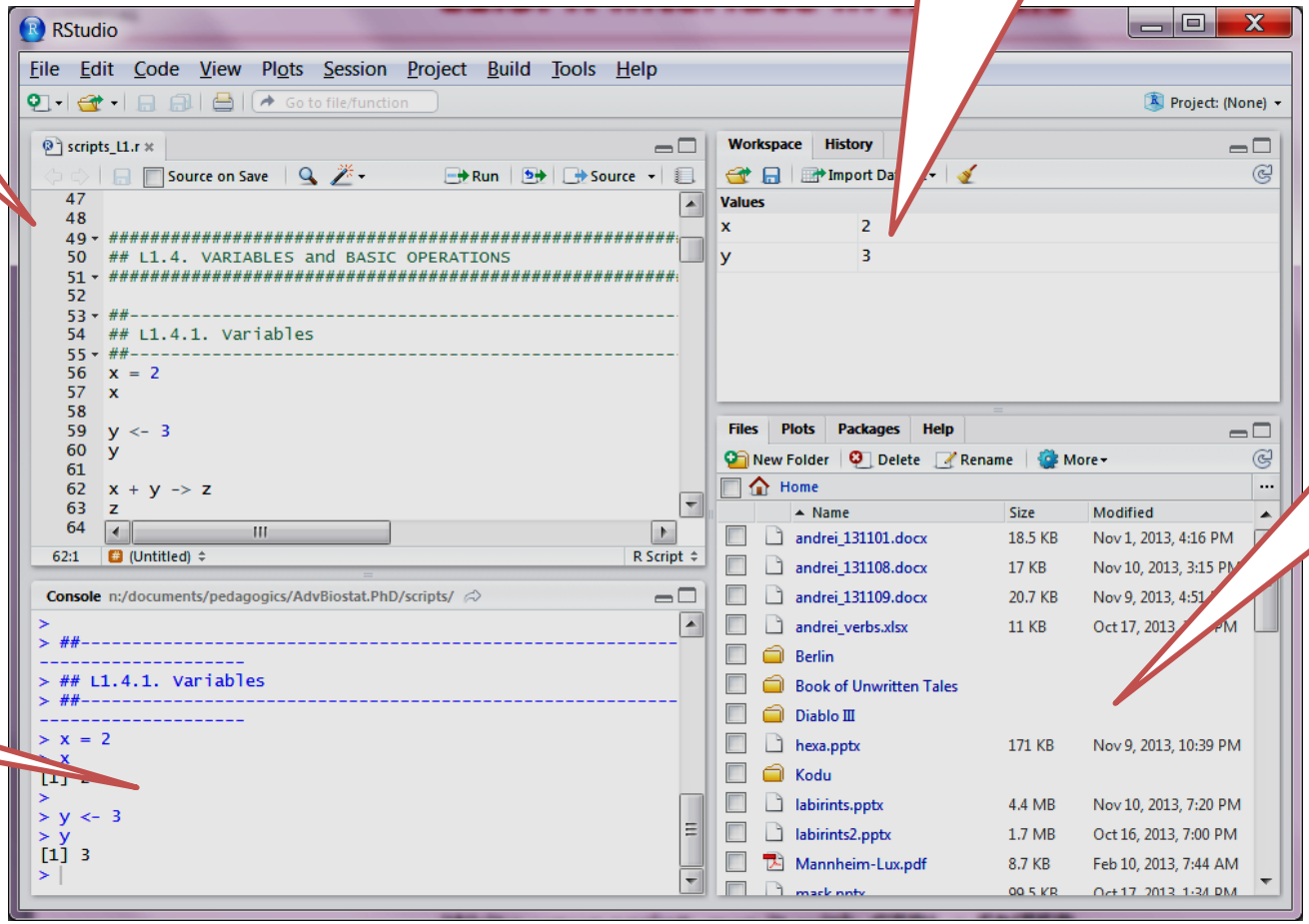
JGR (Win,Linux, McOS)
rforge.net/JGR/

L1. R Interface in RStudio

RStudio (Win, Linux, McOS)
http://rstudio.com/

Variables and History

Sripts



Files,
Plots,
Packages,
Help

Console

Write your script, run it with CTRL + ENTER

L1.1. Basic Operations

Please go through the code at:

http://edu.sablab.net/abs2017/scripts1.html

Section 1.1

L1.4. Types of Variables in R

Atomic Data Types

Numeric
- Integer
- Double

```
1
3.141593
```

Logical

```
TRUE
FALSE
```

Character

```
"Hello, world!"
```

Factor

has a sense to use only in vectors or data frames

```
> answer=factor(c("yes","no"))
> answer
[1] yes no
Levels: no yes
```

Data Containers

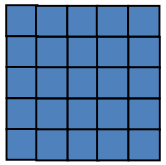
Vector

```
> x
[1] 1 2 3 4 5
```

Matrix

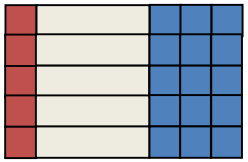
faster then data frame and list other

Array



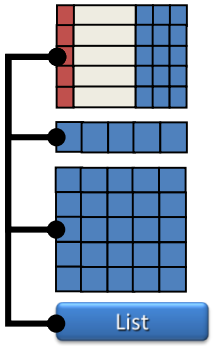
```
> A
     [,1] [,2] [,3]
[1,]    1    3    5
[2,]    2    4    1
```

Data frame



```
  name marks
1 Alex    10
2 Jean     8
3 David    7
```

List



Object of a Class

- Data
- Methods

L1.2. Variables and Operators

Please go through the code at:

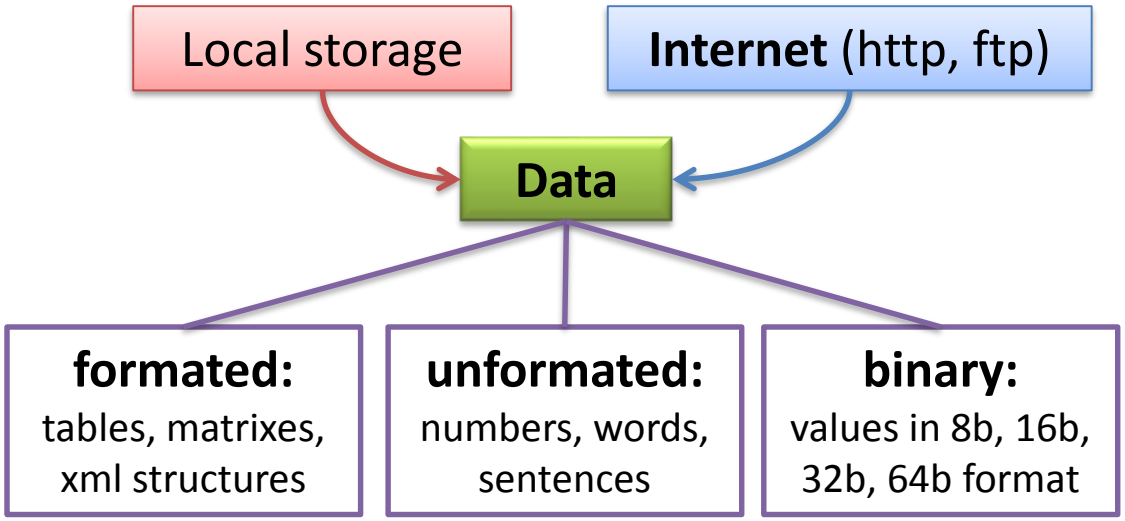
http://edu.sablab.net/abs2017/scripts1.html

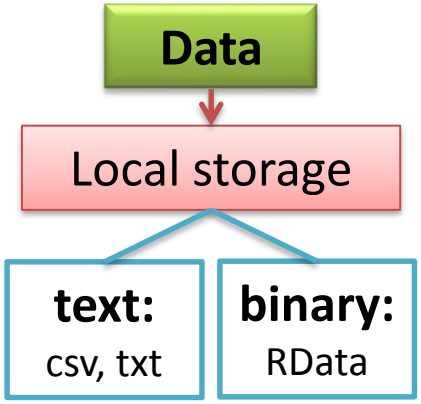
Section 1.2

Do Exercises 1.2

L1.3. Data Import and Export

Way of Data Import and Export





currency.txt

R Data Editor

File Edit Help

	Date	EUR
1	1999-01-04	1.1789
2	1999-01-05	1.179
3	1999-01-06	1.1743
4	1999-01-07	1.1632
5	1999-01-08	1.1659
6	1999-01-11	1.1569
7	1999-01-12	1.152
8	1999-01-13	1.1744
9	1999-01-14	1.1653
10	1999-01-15	1.1626
11	1999-01-18	1.1612
12	1999-01-19	1.1616
13	1999-01-20	1.1575
14	1999-01-21	1.1572
15	1999-01-22	1.1567
16	1999-01-25	1.1584
17	1999-01-26	1.1582
18	1999-01-27	1.1529
19	1999-01-28	1.141
20	1999-01-29	1.1384

L1.3. Data Import and Export

Please go through the code at:

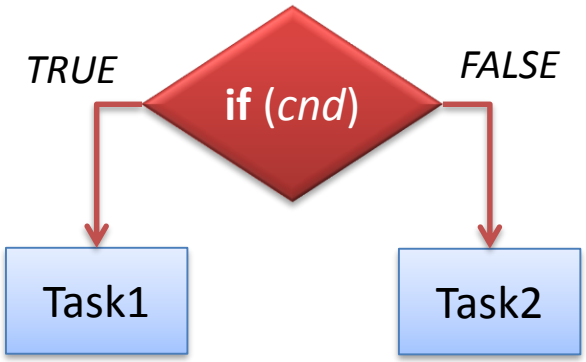
http://edu.sablab.net/abs2017/scripts1.html

Section 1.3

Do Exercises 1.3

L1.4. Control Workflow

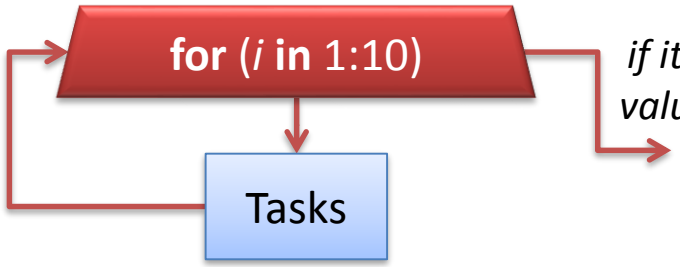
Main Workflow Control Methods



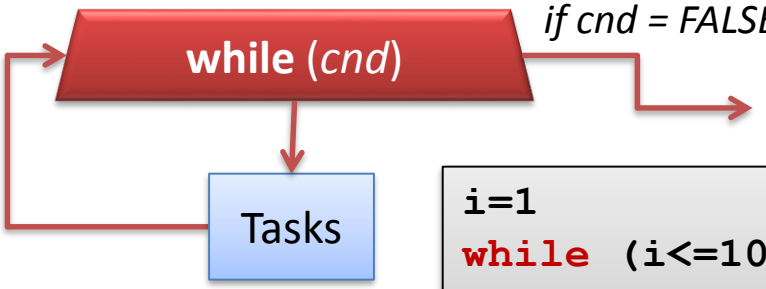

```
if (r > 1) {
    fc = r     ## task 1
} else {
    fc = -r    ## task 2
}
```

Functional version:

```
fc = ifelse(r>1,r,-r)
```




```
for (i in 1:10){
  print(2^i)
}
```




```
i=1
while (i<=10){
  print(2^i)
  i=i+1
}
```

*Command **next** finishes current iteration and starts a new one.*

*Command **break** allows going out from a loop immediately.*

L1.4. Control Workflow

Please go through the code at:

http://edu.sablab.net/abs2017/scripts1.html

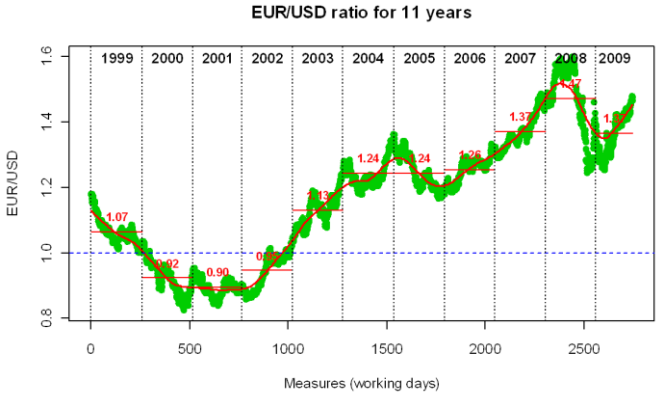
Section 1.4

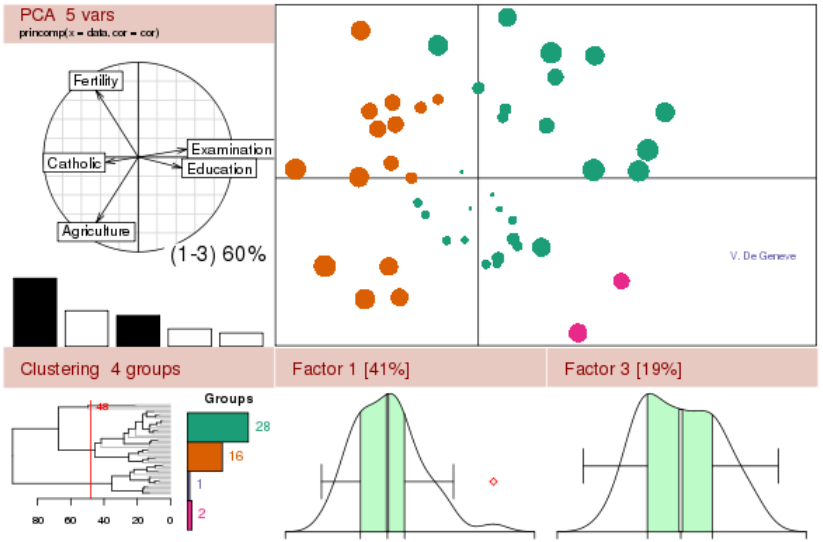
Do Exercises 1.4

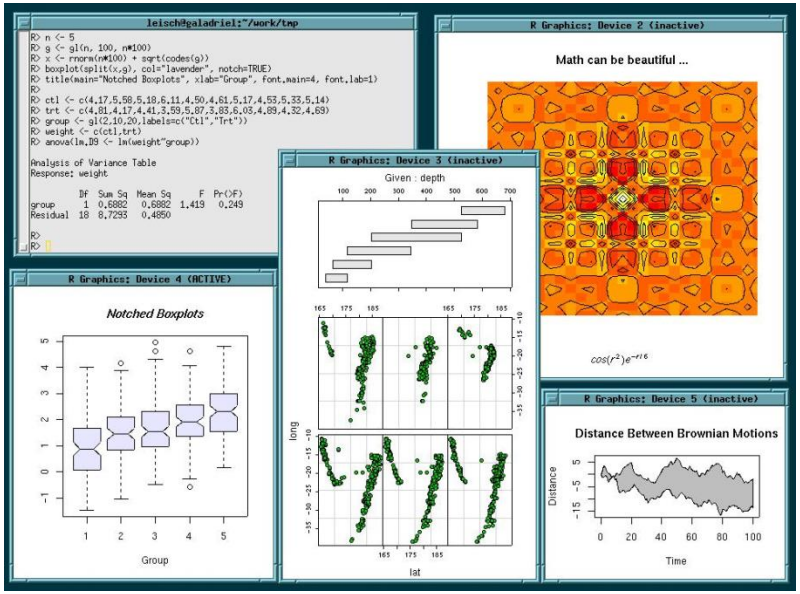
this section is optional

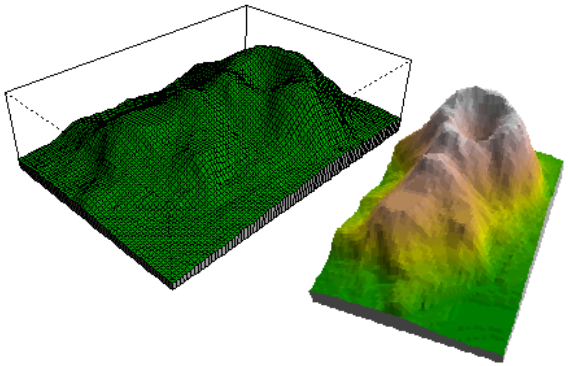
L1.5. Data Visualization

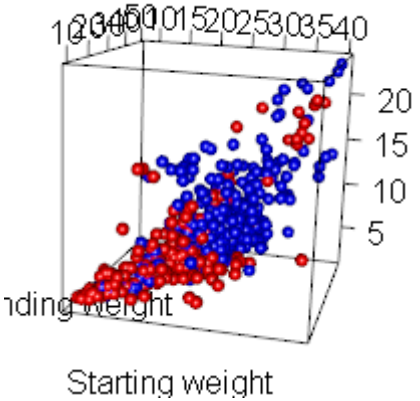
Various Figures Generated in R





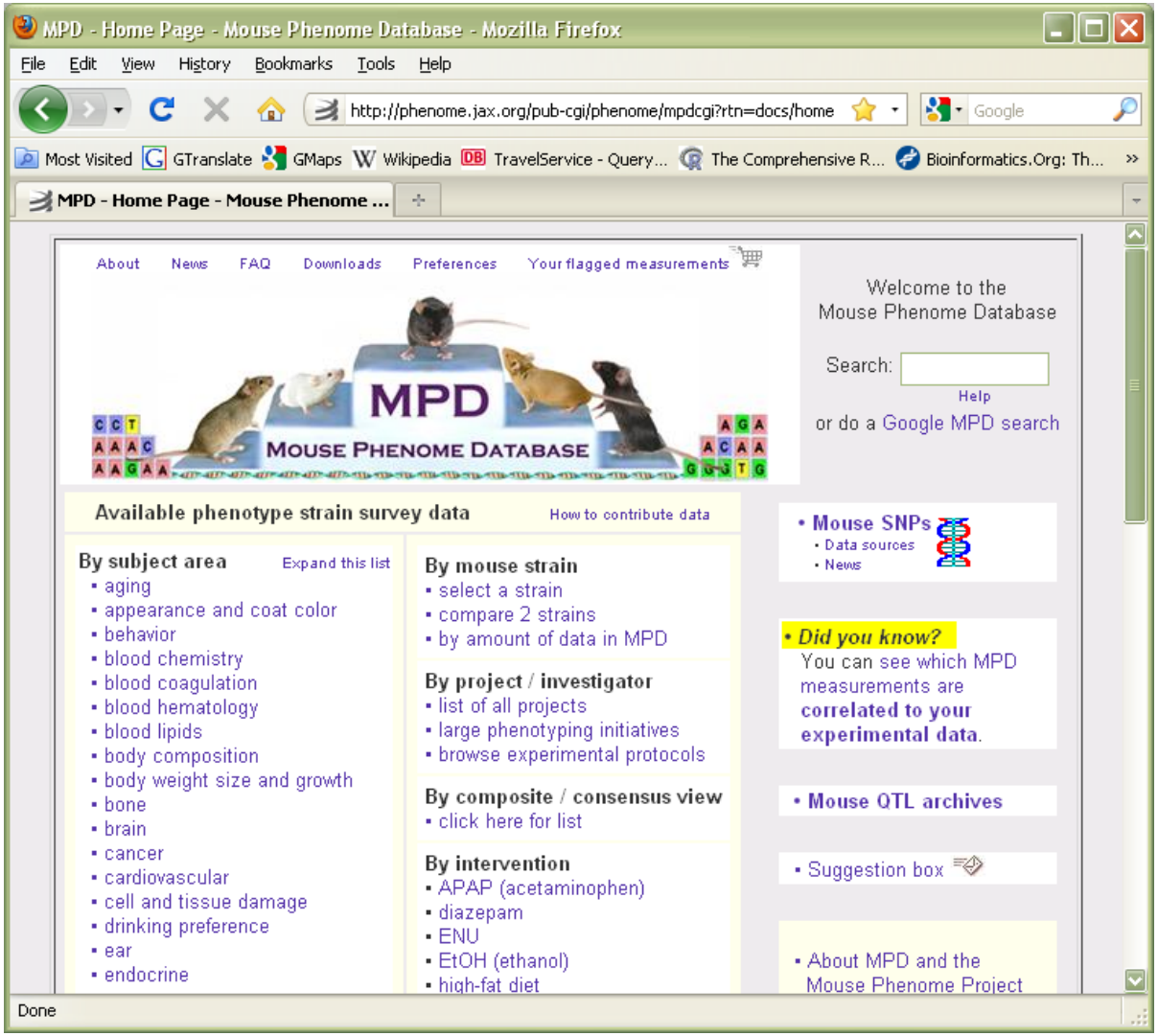






L1.5. Data Visualization

Mouse Phenome Data



mice.txt

Tordoff MG, Bachmanov AA
Survey of calcium & sodium intake and metabolism with bone and body composition data
Project symbol: Tordoff3
Accession number: MPD:103

790 mice from
40 different strains

http://phenome.jax.org

parameter
Starting age
Ending age
Starting weight
Ending weight
Weight change
Bleeding time
Ionized Ca in blood
Blood pH
Bone mineral density
Lean tissues weight
Fat weight

L1.5. Data Visualization

Please go through the code at:

http://edu.sablab.net/abs2017/scripts1.html

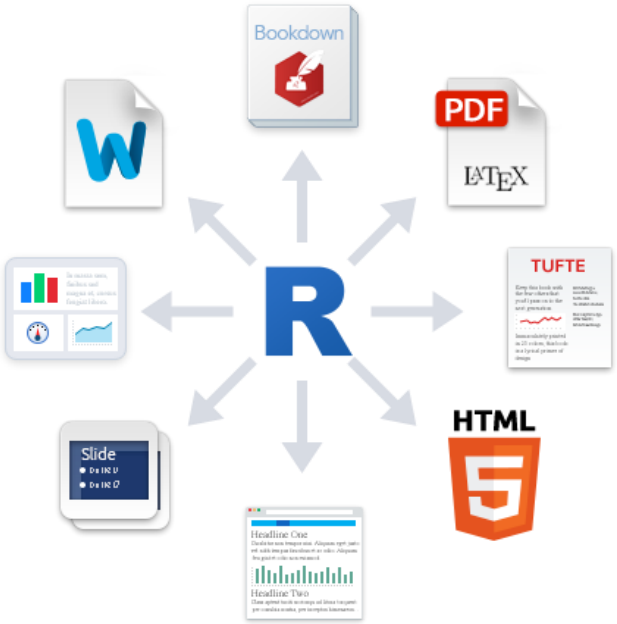
Section 1.5

Do Exercises 1.5

this section is optional

Questions ?

Thank you for your attention



to be continued…

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