Course Introduction

Stat 133 - Concepts in Computing with Data

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gastonsanchez.com
github.com/gastonstat/stat133
Course web: gastonsanchez.com/stat133

Concepts in Computing with Data


Hello
my name is
Gaston

A little bit about me

- Originally from Mexico
- Applied Statistician
- Statistical Programmer
- Data Analyst - Consultant
- Lecturer

data analysis user


making analytical tools

Concepts in Computing with Data?

Concepts in Computing with Data?

Computational Data Analysis

How to use computational tools to conduct a statistical analysis of data

How to use computational tools to conduct a statistical analysis of data

And thinking about Data Analysis

Data Analysis

"Data Analysis is the process by which data becomes understanding, knowledge and insight"

Hadley Wickham

Data Analysis

- Use the computer expressively to conduct statistical analysis of data
- Use existing software rather than build routines from the ground up
- Focus on aspects of computing to conduct statistical analysis, NOT the computational aspects of statistical methods

Quick Questions

Major

How many of you are

- Stats / Math majors?
- Non-stats majors?
- Double majors?

Data Analysis Experience

What's your data analysis experience?

- I'm completely new to data analysis
- I've analyzed data in Excel
- I've used statistical software (SAS, SPSS, etc)

Programming Experience

What's your programming experience?

- I have no programming experience
- I have some programming experience
- I've written some scripts in R, Python, Matlab
- I've used the command line (shell or terminal)

Writing Documents

When writing Docs and Reports

- I use word processors:
  Word, Pages, Google Docs, etc
- I use typesetting systems:
  LaTeX, markdown + pandoc

Preparing Slides

When preparing slides

- I use Power Point, Keynote, Google Slides
- I use LaTeX beamer, markdown, HTML5

Syllabus

Course webpage

gastonsanchez.com/teaching/stat133

Tentative Content

- R Basics
- Statistical Graphics
- Exploratory Data Analysis
- Programming in R
- Regular Expressions
- Data Manipulation
- Data Technologies
- Simulations
- Reporting and Communicating

Course Info

- $\sim$ 15 weeks (Aug 26 - Dec 14)
- $\sim$ 45 hours of lecture
- $\sim$ 30 lab hours
- 3 units

Course Work

- $\sim$ 8 Homework assignments
- $\sim$ 8 Lab assignments
- 2 Exams (midterm Oct-22/23, final Dec-14/15)
- 1 Individual project
- 1 Group project
  more about the projects in the next weeks

Overall Score

Value	Concept
10%	Participation
15%	Lab
25%	Homework
25%	Midterm & Final exam
25%	Projects

Attendance Policy

You are expected to attend all lectures and lab discussions

Office Hours

To be announced ... or by appointment (preferred)

Course Policies

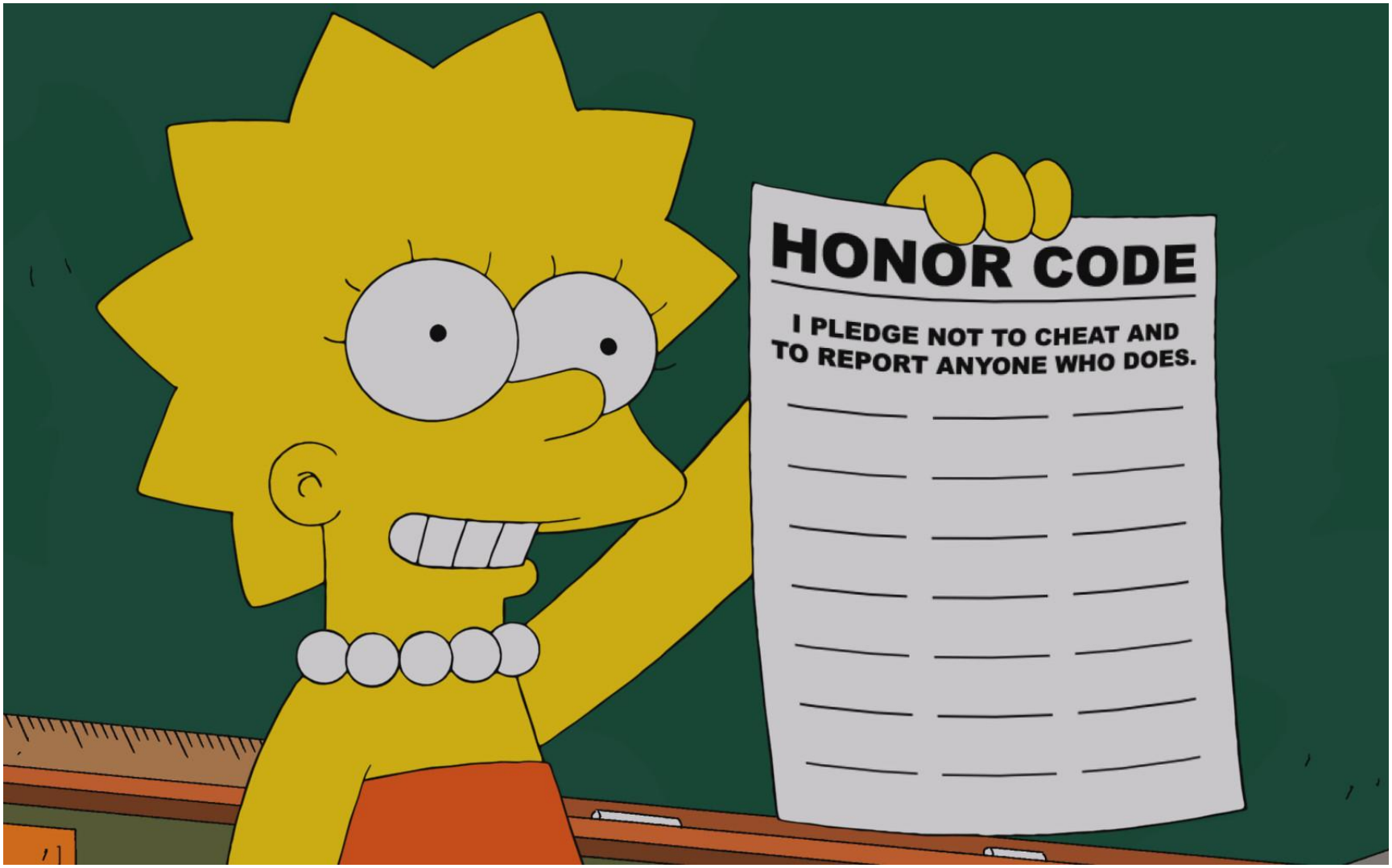
DO’s

DONT’s


9:18 PM
Foursquare
Friends
Places
Me
Matt L. @ (off the grid)
3 hours ago
Eliza N. @ Prava
281 Lafayette St (btw Prince & Houston)
3 hours ago
Kathryn T. @ Gradisca
hm..
3 hours ago
Check-in
Jen D. @ IAC
555 W 18th St (at West Side Highway)
10 mins ago
Tim V. @ Cornelia Street Cafe
Lurking 4 doors from my house for 3
Friends
Places
Tips
More


Finder File Edit View Go Window Help
Mon 10:50 AM
MacBook Air

Please don’t


HONOR CODE
I PLEDGE NOT TO CHEAT AND
TO REPORT ANYONE WHO DOES.

Academic Integrity

- Write your own scripts and code
- You can share ideas and exchange suggestions, but code must be yours
- If you use someone else's code (e.g. find it online), give credit
- Plagiarism won't be tolerated

No email

Email

Email Policy

- Use email as a tool to set up a one-on-one meeting
- Use the subject line Meeting Request
- Include at least two times when you would like to meet
- Include a brief (one-two sentence) description of the reason for the meeting
- Email sent for any other reason will NOT be considered or acknowledge
- Don't expect me to reply right away
  I'm a data analyst, not a professional email responder

Let's talk

Q & A's

I strongly encourage you to ask questions about the syllabus and assignments during class time.

For more in-depth discussions (such as guidance on assignments) please plan to meet in person.

Resources

Course webpage

http://gastonsanchez.com/teaching/stat133

Github Repo

https://github.com/gastonstat/stat133

About this course

Computing with Data (CwD)

Computing with Data (CwD)

- CwD means everything and nothing at the same time
- Data Analysis
- Data Manipulation
- Statistical Programming

Computing with Data

"Computing with data refers to activities in which data is acquired, managed, and processed for a great variety of purposes: organization, visualization, summaries, analysis, etc"

John Chambers

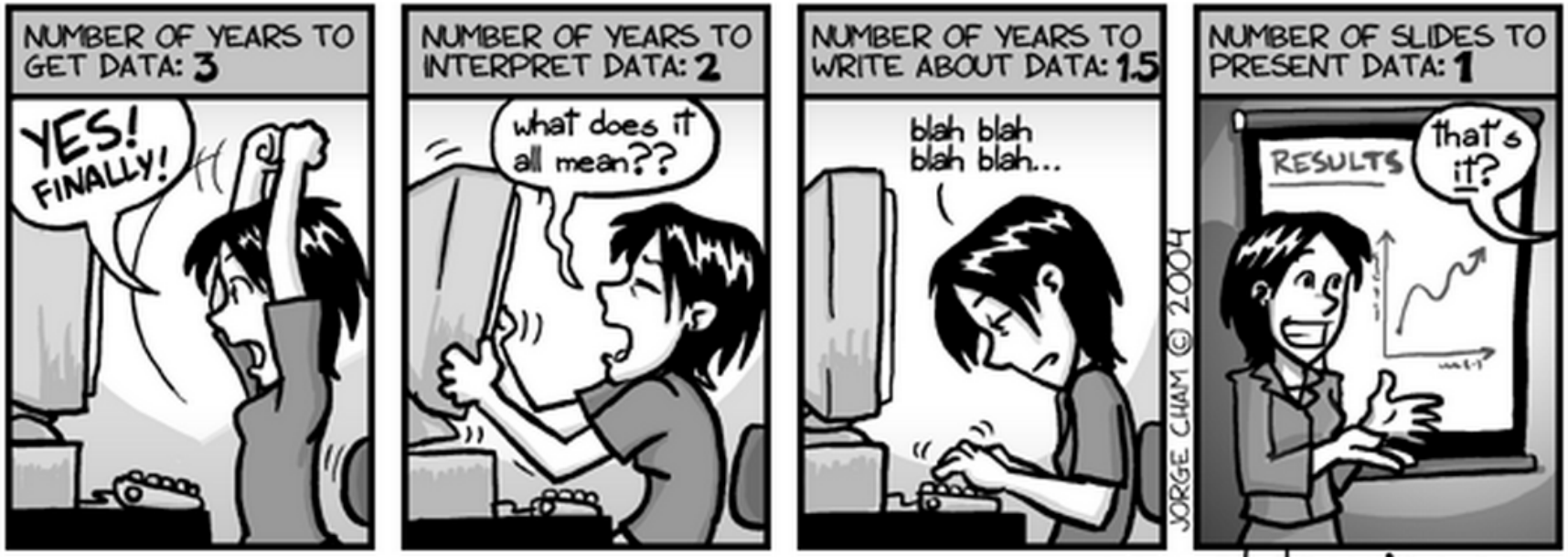
Computing with Data

"Computing with data refers to activities in which data is **acquired**, **managed**, and **processed** for a great variety of purposes: **organization**, **visualization**, **summaries**, **analysis**, etc"

John Chambers

Understanding the Data Analysis Process

DATA: BY THE NUMBERS




NUMBER OF YEARS TO GET DATA: 3
YES! FINALLY!


NUMBER OF YEARS TO INTERPRET DATA: 2
what does it all mean??


NUMBER OF YEARS TO WRITE ABOUT DATA: 1.5
blah blah
blah blah...


NUMBER OF SLIDES TO PRESENT DATA: 1
RESULTS
that's it?

Data Analysis Stages

Workflow

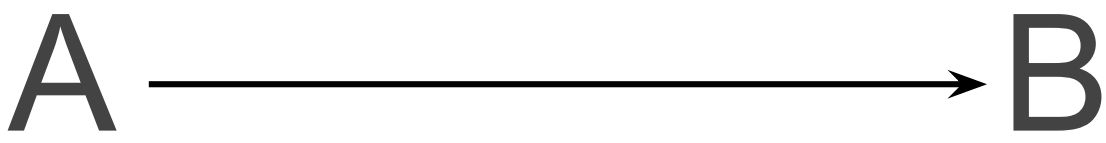
Data Workflow

1. Acquisition-collection
2. Processing and Cleaning
3. Exploration and Visualization
4. Modeling
5. Reporting and Communication

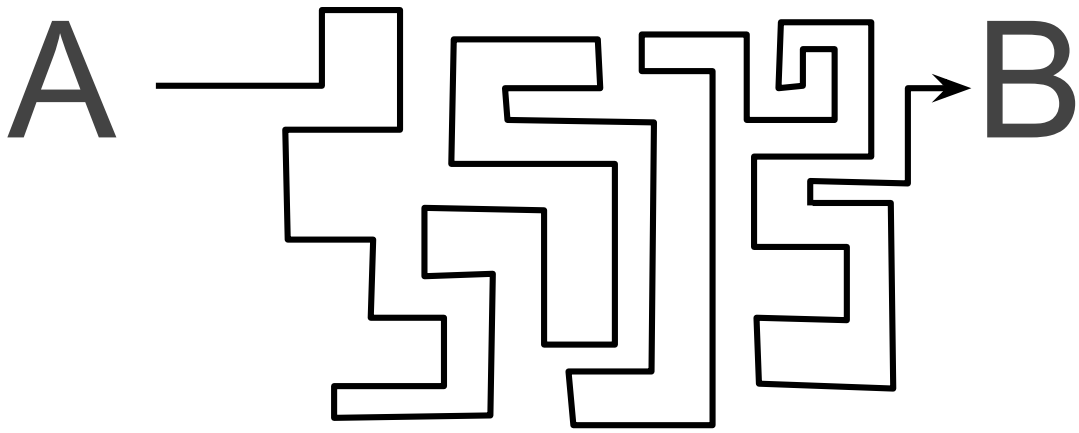
Main Stages of a Data Analysis Cycle

1. Data Acquisition
2. Processing Cleaning
3. Exploration Visualization
4. Data Modeling
5. Reporting Presenting

This is not a linear workflow;
there are iterative cycles at any stage



ideal linear data analysis process



data analysis process in practice

Data Analysis is a lot like cooking & baking

Work Environment

Tools & Utensils

Raw Data


C&H
Pure CANE
CLABBER GIRL
DOUBLE ACTING
BAKING POWD
Gold MEDAL
ALL-
PURPO
PHILADELPHIA
ORIGINAL
pure vanilla extract
pure almond extract

Processing, Cleaning, Organizing

Manipulation

Modeling

Presentation & Consumption

Good -vs- Bad Practices

Housekeeping

Becoming a data scientist
is a **Marathon**, not a sprint

Working Environment

Tools

Tools for this course

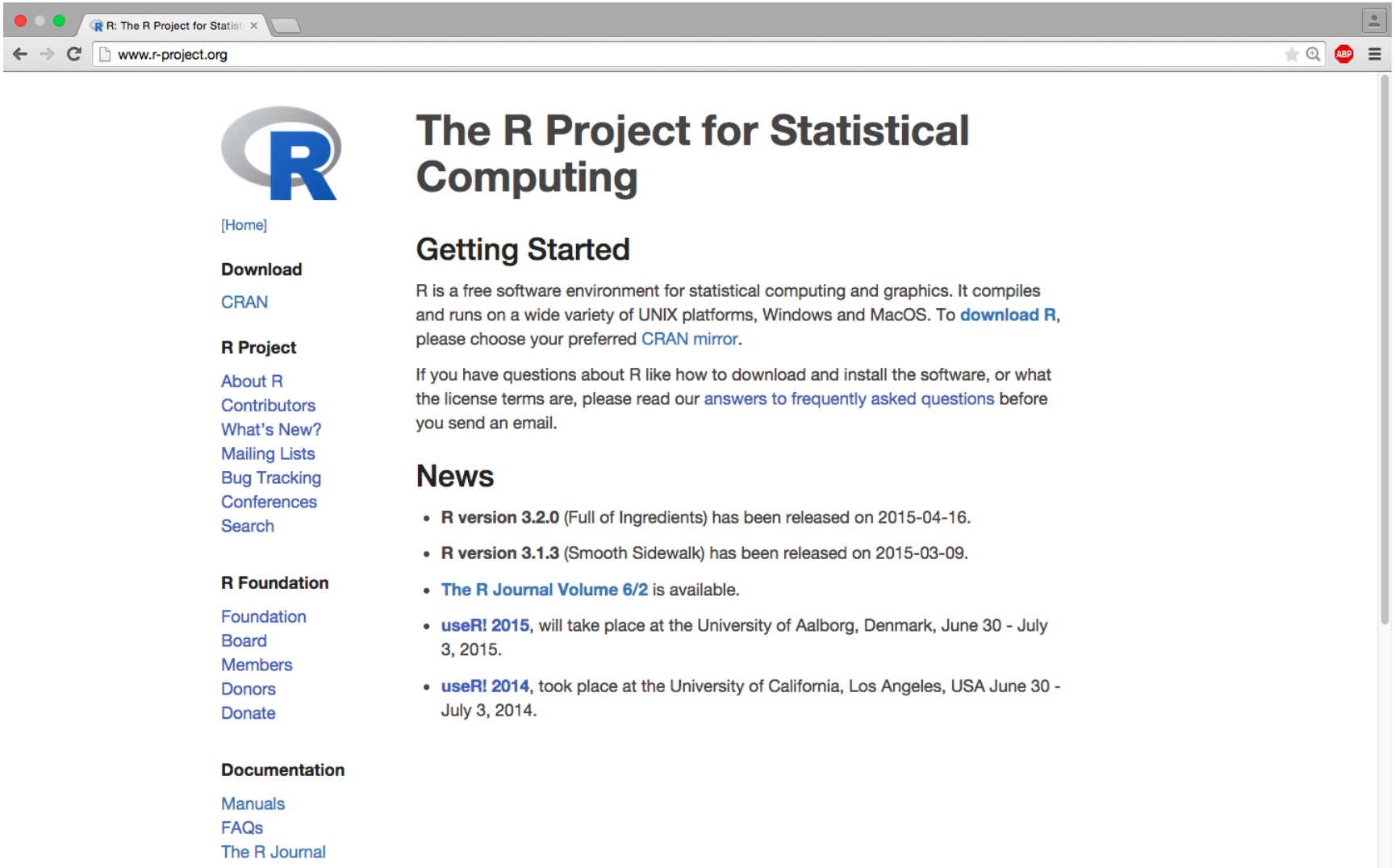
- Computer
- Text Editor
- R (software for data analysis)
- RStudio (IDE)
- Terminal or Command Line
- Latex
- git*
- github account*

Tools

Text editors for OS X, Windows and Linux

Choose a text editor of your preference:

- Emacs: http://www.gnu.org/software/emacs/
- Atom: https://atom.io/
- Sublime Text: http://www.sublimetext.com/
- Vim http://www.vim.org/download.php
- TextWrangler (Mac OS X only):
  http://www.barebones.com/products/textwrangler/
- Notepad ++ (Windows only): https://notepad-plus-plus.org/


R: The R Project for Statist
www.r-project.org
The R Project for Statistical Computing
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What's New?
Mailing Lists
Bug Tracking
Conferences
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Board
Members
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Donate
Documentation
Manuals
FAQs
The R Journal
Getting Started
R is a free software environment for statistical computing and graphics. It compiles and runs on a wide variety of UNIX platforms, Windows and MacOS. To download R, please choose your preferred CRAN mirror.
If you have questions about R like how to download and install the software, or what the license terms are, please read our answers to frequently asked questions before you send an email.
News
R version 3.2.0 (Full of Ingredients) has been released on 2015-04-16.
R version 3.1.3 (Smooth Sidewalk) has been released on 2015-03-09.
The R Journal Volume 6/2 is available.
useR! 2015, will take place at the University of Aalborg, Denmark, June 30 - July 3, 2015.
useR! 2014, took place at the University of California, Los Angeles, USA June 30 - July 3, 2014.

Getting R

Download R

- R project website
  http://www.r-project.org
- Go to CRAN
  http://cran.r-project.org/mirrors.html
- Select closest mirror, e.g.
  http://cran.cnr.Berkeley.edu/
- Choose the right version for your Operating System
  (e.g. Linux, Mac, Windows)

Getting RStudio

Download RStudio

- Rstudio
  http://www.rstudio.com/
- RStudio desktop
  http://www.rstudio.com/products/rstudio/download/
- Choose the right version for your Operating System
  (e.g. Linux, Mac, Windows)

Tools

Rtools (for Windows only)

If you work with Windows, you'll need **Rtools**:

http://cran.r-project.org/bin/windows/Rtools/

Command Line Tools (Mac)

If you've never used the Mac Terminal before, it's likely that you'll need to install the Command Line Tools (you'll know if you need this).

Tools

LaTeX

If you don't have it, install LaTeX:

- TeX Live (Linux): http://www.tug.org/texlive/
- MacTeX (Mac OS X): http://www.tug.org/mactex/
- ProTeXt (Windows): http://www.tug.org/protext/

Tools

git

For all platforms:

http://git-scm.com/book/en/v2/Getting-Started-Installing-Git

github

If you don't have it yet, open a (free) account in github

https://github.com/join