Module 1
Introduction to R
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Instructor
Welcome to class!

1. Introductions
2. Class overview
3. Getting R up and running
About Me

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Introductions

What do you hope to get out of the class?

Why R?
Course Website

http://biostat.jhsphs.edu/~ajaffe/rwinter2015.html

Materials will be uploaded the night before class
Learning Objectives

- Reading data into R
- Recoding and manipulating data
- Writing R functions and using add-on packages
- Making exploratory plots
- Understanding basic programming syntax
- Performing basic statistical tests
Course Format

3 modules per class session, each approximately 1 hour

- "Interactive" Lecture with RStudio + slides
- Lab/Practical experience
Grading

1. Attendance/Participation: 20%
2. Nightly Homework: 3 x 15%
3. Final "Project": 35%
Grading

- Homework 1: Due Tuesday 1/6 by 5pm
- Homework 2: Due Wednesday 1/7 by class
- Homework 3: Due Thursday 1/8 by class
- Project: Due Friday 1/23 by 5pm
What is R?

- R is a language and environment for statistical computing and graphics
- R is the open source implementation of the S language, which was developed by Bell laboratories
- R is both open source and open development

(source: http://www.r-project.org/)
Why R?

- Powerful and flexible
- Free (open source)
- Extensive add-on software (packages)
- Designed for statistical computing
- High level language
Why not R?

• Fairly steep learning curve
  - "Programming" oriented
  - Minimal interface
• Little centralized support, relies on online community and package developers
• Annoying to update
• Slower, and more memory intensive, than the more traditional programming languages (C, Java, Perl, Python)
Installing R

Install the latest version from:  http://cran.r-project.org/

If you have an older version of R, you may not need to update. If you do want to update, re-install and run

```r
update.packages(ask=FALSE)
```
R Studio

(Makes R easier)

- Integrated Development Environment (IDE) for R
  - Syntax highlighting, code completion, and smart indentation
  - Execute R code directly from the source editor
  - Easily manage multiple working directories using projects
  - Workspace browser and data viewer
  - Plot history, zooming, and flexible image and PDF export
  - Integrated R help and documentation
  - Searchable command history

- [http://www.rstudio.com/](http://www.rstudio.com/)
# this is an example of R studio

data(cars)
plot(cars)

output file:
C:\Users\Andrew\Documents\Lieber\Classes\WinterInstitute\Lectures\lecture1/index.m

[1] "index.html"
> data(cars)
> plot(cars)
Working with R

- The R Console "interprets" whatever you type
  - Calculator
  - Creating variables
  - Applying functions
- "Analysis" Script + Interactive Exploration
  - Static copy of what you did (reproducability)
  - Try things out interactively, then add to your script
- R revolves around functions
  - Commands that take input, performs computations, and returns results
  - Many come with R, but people write external functions you can download and use
Useful R Studio Shortcuts

- Ctrl + Enter (Cmd + Enter on OS X) in your script evaluates that line of code
  - It's like copying and pasting the code into the console for it to run.
- Ctrl+1 takes you to the script page
- Ctrl+2 takes you to the console
- [http://www.rstudio.com/ide/docs/usingkeyboard_shortcuts](http://www.rstudio.com/ide/docs/usingkeyboard_shortcuts)
Useful (+Free) Resources

- Homework will involve working through: [http://tryr.codeschool.com/](http://tryr.codeschool.com/)
- UCLA Institute for Digital Research and Education: [http://www.ats.ucla.edu/stat/r/](http://www.ats.ucla.edu/stat/r/)
- R reference card: [http://cran.r-project.org/doc/contrib/Short-refcard.pdf](http://cran.r-project.org/doc/contrib/Short-refcard.pdf)
- Undergrad Guide to R: [https://sites.google.com/site/undergraduateguidetor/](https://sites.google.com/site/undergraduateguidetor/)
- Quick R: [http://statmethods.net/](http://statmethods.net/)