1) Why R?

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What is R?

- R is a programming language
- R is **Open Source** and **free**!
- It is a full-featured programming language, in particular a scripting language.
  - This makes it similar in many ways to MATLAB and Python
- It can be run interactively or as a batch/background job
  - We will mostly be using it interactively
- It is designed by statisticians for statisticians - great at the same sort of tasks as STATA and SAS
- R is being actively developed with ongoing updates/new releases
- The community of R users make a bunch of tools available for tasks like:
  - graphing
  - advanced/specialized statistical models
  - making websites
  - writing books
  - making LaTeX documents like this one!
- Available for Windows, Mac OS X, and Linux

Why should I use R?

- R is widely used (statisticians, scientists, social scientists) and has the widest statistical functionality of any software
- R has tools for pharmacometrics! Examples:
  - `nlmixr`: nonlinear mixed effects modelling in R
  - `PKPDsim` ODE solver/concentration time curve simulations
  - `mrgsolve` ODE solver/concentration time curve simulations
  - `mapbayr` MAP Bayesian estimation of PK parameters
  - `vpc` visual predictive checks of NLMEM/NONMEM results
  - `PKNCA` pharmacokinetic non-compartmental analysis
  - And many, many more tools! Check out more here: https://cran.r-project.org/web/views/Pharmacokinetics.html
- Users add functionality via packages all the time
- R is free and available on all major platforms
  - works well with other collaboration tools like git
- R is very powerful, flexible, and easy to use

- R allows for reproducibility and automating tasks
- R can do essentially anything!
  - For a particularly creative use, check out this repo: github.com/cutterkom/generativeart
- Wide usage helps to improve quality and reduce bugs
- Wide usage means there's a lot of tools available online for help

Why Should I Not Use R?

- Other software is better than R at various tasks
- The *exact* task you need to do was already solved by someone else in some other language.
- R can be much slower than compiled languages (but is often quite fast with good coding practices!)
- R's packages are only as good as the person who wrote them; no explicit quality control + Validation tools to vet package quality exist! Check out: github.com/pharmaR/riskmetric

What are my other options? Get me out of here!

- Python
- Matlab/Octave
- Julia (for pharmacometrics, see `pumas`)
- C/C++
- SAS
- Stata

Administrative Info

One day work shop! Today! 9am-5pm

Microcredit Program

A microcredit in "R for data science" is available!

Requirements:

- Participate in the workshop (so far, great start!)
- Complete the assignment
- Email the assignment to Professor Krzyzanski; wk buffalo.edu

Course Format

- Presentation of material, with example code
- Please ask questions at any time! Interrupt me!
- Mini break-out sessions to try writing your own code

Course material

- All course material is available on github!
- The course material should also have been emailed to you ahead of time.
- For questions, message me at: jasminehannahhughes AT gmail.com

Take a moment now to open the course material in R Studio.

The Legal Stuff

- This workshop includes material from a workshop prepared by Chris Paciorek with contributions from Kellie Ottoboni, Nima Hejazi, Rochelle Terman, Chris Krogslund, and Jarrod Millman; originally presented at UC Berkeley (D-Lab, Dept of Statistics). - Some of this material was drawn from Jared Knowles R bootcamp. - You are free to use, modify and redistribute any of this material with or without attribution. If you liked it and use parts of it in the future, please give a call out to the people above and to myself.