EPISODE 1: Intro and Why Use R?

* What is R?
  + R is a programming language specifically developed for **statistical computing**
  + This means it is particularly good at statistical stuff: managing data, statistical tests, graphs, linear modeling, etc etc etc
* Why use R?
  + R is POPULAR
    - Most new statistical research methods are implemented (programmed) in R
    - Arxiv.org, statistics, January 2021
      * Newest research (unpublished)
      * 20/27 papers used R
  + R is FLEXIBLE
    - Packages to do what you want
    - Updating often
    - Put it on Windows, Mac, Linux
    - I made these slides in R
  + GRAPHS
    - R graphics and visuals are top-notch!
  + R is FREE
    - Open-source
    - Anyone can contribute
    - Managed by R core team
* Caveats of using R
  + R is FREE
    - SAS has a dedicated SAS help team, dedicated statisticians
      * In R you may have to really dig deep to find solutions
    - SAS has more quality control
      * You know what to expect, generally, from SAS
        + Anecdote about guy who wrote all his stuff from scratch
      * However, R has the core team
      * The CRAN repository is generally high quality
      * However! R updates may change things, and packages may stop being “maintained”
  + You have to ask R for exactly what you want
    - SAS gives you a lot of output and you find what you need
    - R gives you more minimal output

EPISODE 2: Installing R and Rstudio

* Installing R (windows and mac)
  + R is the programming language
* Installing Rstudio (windows and mac)
  + Rstudio is the IDE (Integrated Development Environment)
  + You don’t need it to use R
  + But Rstudio is INCREDIBLY CONVENIENT…

EPISODE 3: Rstudio cloud

EPISODE 4: Tour of Rstudio

* Tour of Rstudio
  + Console
  + Scripts
  + Make a script (hello world)
  + Running code from scripts
  + Saving scripts for use later
  + Display/plot window
  + Environment variables/history
  + Tools: Set working directory (think libname)
  + Change appearance
  + Etc. etc.

Episode 4: Very basic R programming

* R programming concepts
  + Objects…object oriented (compare to SAS)
  + Kinds of objects!
    - Data
      * Making data
        + Data frames and lists
      * Reading in data
      * Manipulating data
        + Vectorization
        + Mathematical operations
        + Extracting data values
        + Dimensions
        + Etc.
    - Variables (strings/numbers)
  + Comments
  + Base r and Packages
    - Loading packages
  + Rough and dirty plots in base r…we will go into this later
    - Scatterplot
    - Barplot
    - Histogram

Episode 5: T Test in R

* T test
  + Reminder: when to use (comparing continuous variable between two categories)
  + Assumptions (check assumptions)
  + Implement test
  + Output/results/interpretation
  + Compare to SAS

Episode 6: Chi-squared test in R

* Chi squared test
  + Reminder: when to use (comparing proportions between two categories, comparing independence between two categories…etc)
  + Assumptions (check)
  + Implement test
  + Output/results/interpretation
  + Compare to SAS

Episode 7: R Markdown

* What it is
  + A way to typeset things in R
  + Get it ready for printing
  + Useful for presentations
  + How to install it
  + Parts of markdown doc:
    - Header
      * Set options, title, etc
    - Markdown
      * Write text, mathematical equations
    - R Code
      * R code