R Lesson 2

The R Environment

- Redirecting TEXT Output (results)
  - sink("filename", split=TRUE)
    - filename = name & path of output file
    - split=TRUE – sends output to both file and console
    - split=FALSE – sends output to file only
  - sink() - closes file
  - getwd() – shows default path

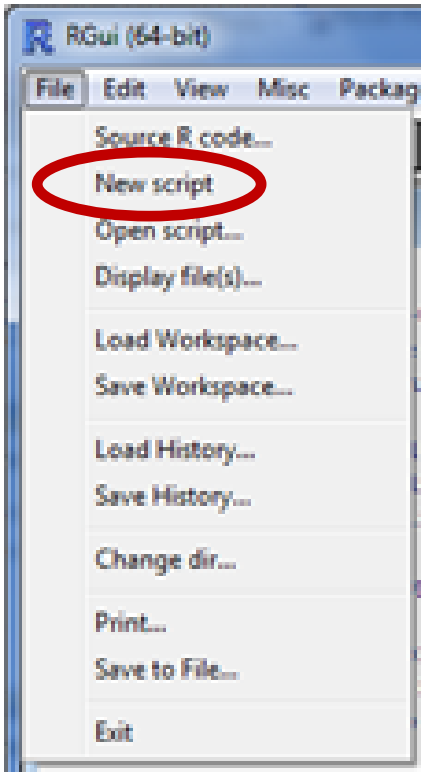
The R Environment

- Scripts
  - Save and retrieve your work (R “programs”)
  - Text files with .R extension
  - Use R Editor, Word, Emacs, or other text editor
  - Beware of Office quote marks & capitalization
  - Use { } to extend a statement on multiple lines
  - Ctrl+r (Windows) or command+return (Mac) executes highlighted script commands

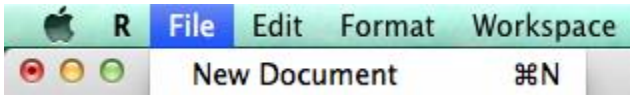
The R Environment

Opening the R Editor to Create a Script

- Windows



- Mac



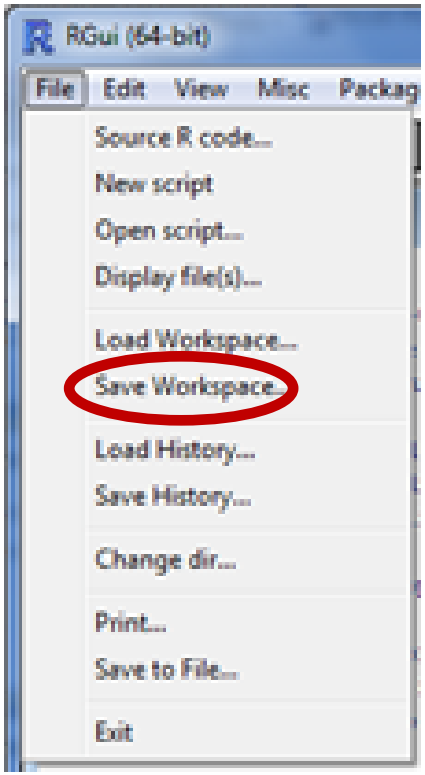
The R Environment

- The R Workspace
  - Collection of objects currently stored in R
  - Objects created or loaded during R session
  - objects() or ls() – display contents of workspace
  - May be saved as file – has RData extension
  - Saving when prompted at end of session creates both .Rdata and .Rhistory files
  - R reloads these files next time you run R

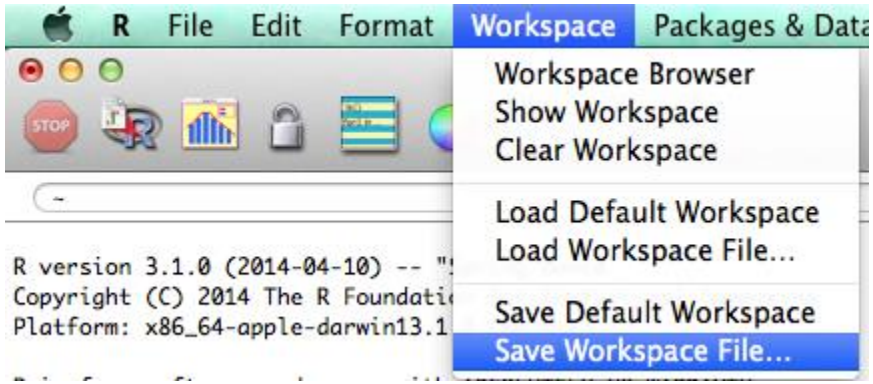
The R Environment

Saving the Workspace

- Windows



- Mac



The R Environment

Script Commands to Save and Load Workspaces

- Save

save.image("C:/Users/kinchelf/Documents/DemoWorkspace.RData")

- Load

load("C:/Users/kinchelf/Documents/Jan3.RData")

Note: Windows can also use \\ in paths

getwd() – shows default path

Good Housekeeping

- Know what you have - objects() or ls()
- Use meaningful names
- Clean up what you don't need
  - rm(*UnwantedObject*) – removes single item
  - rm(list=ls()) – removes everything
    - Use judiciously especially in shared environment
    - Avoid if you have created functions you want to keep

The R Environment

- Packages
  - Extend functionality of R
  - May need to download and install package first
- Libraries – folders of installed packages
  - Use library() to show available packages 
  - Use library(PackageName) to load
  - Use search() to see which packages are loaded
  - foreign – required for accessing external data such as SAS
  - boot – contains bootstrap functions 

Getting Help

- ?*functionname* – opens help page for function
- *functionname* – displays code of function
- example(*functionname*) – gives examples
- demo(*functionname*) – demo of some functions
- ??*keyword* – opens possible help pages
- ??"*multiple words*"
- PDF documents
- The Internet

Working with Data in R

Storage Containers in R

- Named data structures (objects)
- Vector – series of data values
- Scalar – single value vector
- Matrix or array – multidimensional vectors of same data type (matrix: 2 dimensions)
- Factor – grouping by category
- Data frame – matrix-like structure with different data types
- Function – object containing program code
- Typically returned by class() function

R Data Types

- Numeric
  - Integer
  - Double
- Logical – True/False
- Character
- List – elements not of same type (also a structure)
- Complex - (real + imaginary)
- Raw – data bytes represented as 2 hex digits
- Typically returned by mode() function

Information About Objects

- class(*objectname*) – reveals type of object
- mode(*objectname*) – reveals data type
- summary(*objectname*) – additional info depending on class of object
- str(*objectname*) – **str**ucture details of R object
- length(*objectname*) – number of values

Quirky Things About R

- Many **R** objects have a class attribute, a character vector giving the names of the classes from which the object *inherits*. If the object does not have a class attribute, it has an implicit class, "matrix", "array" or the result of mode(x) (except that integer vectors have implicit class "integer").
- No class: class=mode

(Demo Info functions)

R Operators

- Arithmetic and Assignment Operators

Operator	Description
+	addition
-	subtraction
*****	multiplication
/	division
^ or **	exponentiation
x %% y	modulus (x mod y) 5%%2 is 1
x %/% y	integer division 5%/%2 is 2
x<-y or y->x	assignment; x gets y
:	create series (1:10)

R Operators

- Logical Operators

Operator	Description
<	less than
<=	less than or equal to
>	greater than
>=	greater than or equal to
==	exactly equal to
!=	Boolean not equal to
!x	Not x
x | y	x OR y (for vectors - x , y are logical tests)
||	OR for scalars (use with IF: IF x or y)
x & y	x AND y (for vectors)
&&	AND for scalars (use with IF: IF x and y)
isTRUE(x)	test if X is TRUE