**RStudio: Organize Working Directory**

Demo: Add folders (using New Folder option) **data, documents, and scripts. Add data\_raw using command.** dir.create("data\_raw")

**RStudio: Check Working Directory**

Demo: Navigate to ~test/test/scripts and set as working directory using More-> Set As Working Directory.

Then type getwd() in console to get new working directory path.

Change path back by entering setwd("C:/Users/morninija/Documents/R/Test/Test").

Then do getwd() again to view working directory path.

**Console Pane**

Demo: In console, note that R has built in many mathematical functions:

sin(1) (press enter)

Sin(1 (press enter, show +, then press escape)

**Script Editor**

Demo:

Type in script editor:

sin(1) # trigonometry function

cos(1) # trigonometry function

log(1) # natural logarithm

**Creating Objects in R and Assigning Value**

Demo: (in console to show outputs)

3+5

12/7

Demo (in console):

weight\_kg <- 55

Show how the object and value now appear under environment tab.

**Assignment**

Demo: In console:

(weight\_kg<-55)

weight\_kg

Also show weight\_kg in environment tab

Demo: In console: 2.2\*weight\_kg

Demo: weight\_kg<-57.5

2.2\*weight\_kg

Demo: In console:

weight\_lb <- 2.2 \* weight\_kg

weight\_kg<-100

Demo : In console:

weight\_lb

126.5 (change in the value of the weight\_kg object didn’t change the value of weight\_lb)

**Comments**

Demo: In script editor:

sum(1,2,3) #sum of numbers

Run script, note that comment isn’t interpreted.

**Functions and their Arguments (1)**

Demo:

Here is an example of a function call:

Enter in console:

a=4

b<-sqrt(a)

b

**Functions and their Arguments (2)**

Demo (in console):

Let’s try a function that can take multiple arguments: round().

**round**(3.14159)

## 3

In console:

?round

Note help tab with documentation.

Enter in console:

**round**(3.14159, digits = 2)

## [1] 3.14

**RStudio Help Interface**

Demo (in console):

If you need help with a specific function, let’s say barplot(), you can type:

?barplot

(show description in help tab)

Demo (in console):

??plot

**Getting Help from the R User Community (1)**

Demo (in console):

saveRDS(weight\_kg, file="~/R/Test/Test/weight\_kg.rds")

Demo (in console):

weight\_kg <- readRDS("~/R/Test/Test/weight\_kg.rds") (click on RDS file in folder to generate this script)

**Show new object appears under Environment.**

Demo (in console): sessionInfo()

Show output.

**Will you be going over how to connect to a git repository from RStudio?**

* Here’s the [Data Scientist’s Toolbox Coursera training](https://www.coursera.org/learn/data-scientists-tools) I mentioned during the class, which covers connecting to GitHub from RStudio. Here is a [tutorial from GitHub](https://resources.github.com/whitepapers/github-and-rstudio/) that covers how to create R Markdown documents with RStudio and publish them via GitHub, using GitHub Pages.

**Why do you need set the directory as a working directory?**

* The free E-Book *An Introduction to R* provides [a helpful overview of working directories](https://intro2r.com/work-d.html) (and detailed help on using R/RStudio, with screenshots): “The working directory is the default location where R will look for files you want to load and where it will put any files you save. One of the great things about using RStudio Projects is that when you open a project it will automatically set your working directory to the appropriate location.”

**Will variables maintain that value until you close out the console or reassign that variable?**

* Here is information on data permanency and removing objects from [*An Introduction to R*](https://cran.r-project.org/doc/manuals/r-release/R-intro.html#Data-permanency-and-removing-objects): “All objects created during an R session can be stored permanently in a file for use in future R sessions. At the end of each R session you are given the opportunity to save all the currently available objects. If you indicate that you want to do this, the objects are written to a file called .RData6 in the current directory, and the command lines used in the session are saved to a file called .Rhistory.” In RStudio, you can save the values of objects to view in a future session if you choose to “Save workspace image” when you quit the session (an automatic pop-up option that comes up when you choose to quit the R session).

**What's the difference between = and <- for assigning values to a variable?**

* Here is the explanation of the difference between the two operators from R user documentation on [assignment operators](https://stat.ethz.ch/R-manual/R-devel/library/base/html/assignOps.html): “The operators <- and = assign into the environment in which they are evaluated. The operator <- can be used anywhere, whereas the operator = is only allowed at the top level (e.g., in the complete expression typed at the command prompt) or as one of the subexpressions in a braced list of expressions.” A more detailed explanation on the differences between the operators can be found in [this StackOverflow response](https://stackoverflow.com/questions/1741820/what-are-the-differences-between-and-assignment-operators-in-r).

**Should we install the rtools package?**

* According to [RDocumentation](https://www.rdocumentation.org/packages/installr/versions/0.23.2/topics/install.Rtools), “Rtools is a collection of software for building packages for R under Microsoft Windows, or for building R itself (version 1.9.0 or later).” If you plan on building packages for R, you may want to install Rtools, but otherwise, it probably isn’t needed. You may want to install the [Installr package](https://cran.r-project.org/web/packages/installr/index.html), since this package can be used to automate the updating of R in Windows.

**How do we check for updates? How do we know when there's a new R version?**

* Here are instructions (from class materials from an R course at UMass Chan Medical School) on [how to use the installr package to automatically check for R updates](https://bootstrappers.umassmed.edu/bootstrappers-courses/courses/rCourse/Additional_Resources/Updating_R.html) (for Windows). You can also always check [CRAN](https://cran.r-project.org/) to download the latest version of R for all operating systems.

**What about R updates (3.4 vs 3.3)?**

* Here is a [summary of changes](https://stat.ethz.ch/pipermail/r-announce/2017/000612.html) implemented in the R 3.4.0 release. Information on updates to R can be found under the [What’s new? Section on CRAN](https://www.r-project.org/news.html).

**Can R work with arrays and loops (for loops, while loops, etc)?**

* Here is a tutorial from Data Carpentry on [Loops in R](https://swcarpentry.github.io/r-novice-inflammation/15-supp-loops-in-depth/), and a tutorial is available from W3School on [R Arrays](https://www.w3schools.com/r/r_arrays.asp).

**You can use R for all statistically analysis that you have been doing with excel file? You just have to give the command for the R?**

Here are a few suggestions for free online trainings and resources for learning statistical analysis techniques with R:

* [R for Data Science: Model section](https://r4ds.had.co.nz/model-intro.html) (section from free eBook)
* [Introduction to Statistical Modeling in R](http://www.statslab.cam.ac.uk/~pat/redwsheets.pdf) (PDF) (class notes, P.M.E. Altham, Statistical Laboratory, University of Cambridge)
* [A course in statistics with R](https://onesearch.nihlibrary.ors.nih.gov/permalink/01NIH_INST/15et3fj/alma991001220595604686) (eBook available through NIH Library)
* [Basic Statistics with R: reaching decisions through data](https://onesearch.nihlibrary.ors.nih.gov/permalink/01NIH_INST/15et3fj/alma991001327256004686) (eBook available through NIH Library)

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**Can the equal sign only be used to assign numerical values to objects?**

* The = operator can be used as the assignment operator in a broader context then just assigning numerical values. See the post “[difference between assignment operators in R](https://www.r-bloggers.com/2014/01/difference-between-assignment-operators-in-r/)” for additional examples and further explanation.

**The file, tools, etc. tabs at the top of the Rstudio application above the green + symbol. Would they not be visible in different versions of RStudio?**

* I couldn’t find much documentation on the top menu of dropdown options, but I did see some screenshots of older versions of RStudio where the top menu wasn’t displayed. I’d make sure you have the newest version of RStudio, which can be [downloaded here](https://posit.co/download/rstudio-desktop/#download).

**Is there a place you can copy the file pathway from or do you need to type it out yourself?**

From the help documentation I looked at, you can also just enter the file names instead of the whole file path, and the RDS file will just save in your working directory. [See this training section](https://rstudio-education.github.io/hopr/dataio.html) on saving R data files for more information.

Please complete the class evaluation [https://forms.office.com/g/6e6EUkgNm8](https://gcc02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fforms.office.com%2Fg%2F6e6EUkgNm8&data=05%7C01%7Cjoelle.mornini%40nih.gov%7Cbad65e59e0b24ded2cab08dae919e8f9%7C14b77578977342d58507251ca2dc2b06%7C0%7C0%7C638078594733811086%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=sTa3d5oxxuzu8%2FpoWotMpE3GwRtl5lvcwFBtuldWfRI%3D&reserved=0)

which should take only 1-2 minutes. Please let us know how the class went and what other class topics you would be interested in attending. The evaluation is anonymous.