1808-351-351m-451-w02b-p2-IntroToRcode.R

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```
# Script Name: 2016 SDLE Tea_Time_Class_1.R
# Purpose: Learning R
# Authors: Ethan Pickering
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# Latest Changelog Entires: v0.00.01 - tea_time_class1.R - Ethan Started it

# This is in the 2017 SDLE Tea-time Learning Repo
# https://bitbucket.org/cwrudsci/17-sdle-teatime/overview


# A pound symbol, or "Hashtag" indicates a comment in the code

# Assigining Operators

## PRO TIP ## - Control enter runs the line you are on or a highlighted section

# Assign number

  x <- 5

# Lets view it with function View()

  View(x)

# We can also look into what view is as a function and how it works

  ?View() # The question command shows us the help file
```

```
## starting httpd help server ... done
```

```
# Assign a vector or array of numbers, from 1 - 5

  x <- 1:5

# You could also use = instead of <-
# But Google Style Guide says DON'T
# <- Assignment operator is clearer

# Assign a character string

  B <- "hello"

# Use print function to print to console

  print(B)
```

```
## [1] "hello"
```

```
  print(x)
```

```
## [1] 1 2 3 4 5
```

```
# R Object and type of classes
# Characters, integers, numeric, complix, Logic (TRUE/FALSE)

# R Vectors

  a = c("hello","wolrd")
  A = c("hi", 5)
  c = c(1.23452, 2.1435, 3.14)

# The function c() here is "concatenate" so it will combine the values

  false = TRUE

# These will have attributes such as dimensions, object class, and length

# Lets check all of the attributes

  class(a)
```

```
## [1] "character"
```

```
  class(A)
```

```
## [1] "character"
```

```
  class(x)
```

```
## [1] "integer"
```

```
  class(c)
```

```
## [1] "numeric"
```

```
  class(false)
```

```
## [1] "logical"
```

```
  false
```

```
## [1] TRUE
```

```
# There are also factors - but we will dive into those later, they are categorical
# Oh and lists... probably the most dynamic object in R

# These classes are default by what R interprets them to be, but we can change them

  c = as.character(c)
  class(c)
```

```
## [1] "character"
```

```
# Other class changing functions

  as.numeric(x)
```

```
## [1] 1 2 3 4 5
```

```r
  as.integer(x)
```

```
## [1] 1 2 3 4 5
```

```r
  as.POSIXct(1442866615,origin = "1970-01-01") # A Date Format
```

```
## [1] "2015-09-21 16:16:55 EDT"
```

```r
  as.factor(x)
```

```
## [1] 1 2 3 4 5
## Levels: 1 2 3 4 5
```

```r
  as.list(x)
```

```
## [[1]]
## [1] 1
##
## [[2]]
## [1] 2
##
## [[3]]
## [1] 3
##
## [[4]]
## [1] 4
##
## [[5]]
## [1] 5
```

```r
  as.data.frame(x) # An incredibly useful object
```

```
##   x
## 1 1
## 2 2
## 3 3
## 4 4
## 5 5
```

```r
# Lets check the lengths of the variables

  length(a)
```

```
## [1] 2
```

```r
  length(A)
```

```
## [1] 2
```

```r
  length(x)
```

```
## [1] 5
```

```r
  length(c)
```

```
## [1] 3
```

```r
  length(false)
```

```
## [1] 1
```

```r
# Other nice functions to create objects, seq(), matrix(), vector(), array()

  m = seq(1, 24, by = 3)
  n = matrix(0, nrow = 3, ncol = 3)
  print(n)
```

```
##      [,1] [,2] [,3]
## [1,]    0    0    0
## [2,]    0    0    0
## [3,]    0    0    0
```

```r
# Lets look at the dimensions

  dim(n)
```

```
## [1] 3 3
```

```r
# Lets also reset some of the variables
# The format for pulling values is [row, column]

  n[2,2] = 2
  print(n)
```

```
##      [,1] [,2] [,3]
## [1,]    0    0    0
## [2,]    0    2    0
## [3,]    0    0    0
```

```r
# We can be even more efficient, say all of column 1 is 3

  n[,1] = 3
  print(n)
```

```
##      [,1] [,2] [,3]
## [1,]    3    0    0
## [2,]    3    2    0
## [3,]    3    0    0
```

```r
# Next lets turn the matrix into a dataframe - this will allow multiple classes

  n = as.data.frame(n)
  n[1,2] = "character"
  n[,3] = TRUE
  print(n)
```

```
##   V1        V2   V3
## 1  3 character TRUE
## 2  3         2 TRUE
## 3  3         0 TRUE
```

```r
  class(n)
```

```
## [1] "data.frame"
```

```r
  class(n[,1])
```

```
## [1] "numeric"
```

```
  class(n[,2])
```

```
## [1] "character"
```

```
  class(n[,3])
```

```
## [1] "logical"
```

```
# Another useful tool is to bind datasets with rbind() and cbind()

  a = 1:5
  b = 20:24
  rbind(a,b)
```

```
##   [,1] [,2] [,3] [,4] [,5]
## a    1    2    3    4    5
## b   20   21   22   23   24
```

```
  cbind(a,b)
```

```
##      a  b
## [1,] 1 20
## [2,] 2 21
## [3,] 3 22
## [4,] 4 23
## [5,] 5 24
```

```
  d = cbind(a,b)

# These must be of equal length along the dimension you wish to bind
# Sam rows/same columns

# Other useful functions to mention, which(), mean(), sd(), min(), max()

  row = which(d[,1] == 2)
  print(row)
```

```
## [1] 2
```

```
# Note above  the two equal signs that are necessary to check for equivalence

  mean(d)
```

```
## [1] 12.5
```

```
  sd(d)
```

```
## [1] 10.12423
```

```
  min(d)
```

```
## [1] 1
```

```
  max(d)
```

```
## [1] 24
```

```
# For and IF statements, basic structure and example
#sturcure

for (i in 1:5) { # How much it should loop, and the values
```

```
  # Input what you want it to do
}

if ( i == 5) { # Let it know what to check for
  # What you want to do if condition is met
}
```

```
## NULL
```

```
# Example

  length = length(d[,1])

  for (i in 1:length) {

    d[i,1] = 100

    if (i == 2) {
      d[i,1] = 200
    }

  }

  print(d)
```

```
##        a  b
## [1,] 100 20
## [2,] 200 21
## [3,] 100 22
## [4,] 100 23
## [5,] 100 24
```

```
# Writing and Reading data files

# Working directories
# Lets find where you are

  getwd()
```

```
## [1] "D:/Git/18f-dsci351-351m-451-prof/2-class"
```

```
# Now we can set the directory we want, you must have R point to the directory
# that you either want to save to or read from
#setwd("path")

# PRO TIP the path . gives you the current, and .. gives you the one before
# Say I need to go two folders back and up one to data, I would enter
# setwd("../../data)
# Or if data was the next folder in from where I was setwd("./data)

# Set the working directory where you want
# BUT only do this once in a script
# Or use a project to set the base directory path
# And you USE RELATIVE PATHS from then on.

#  setwd("./class")
```

```r
# Lets write a .csv

  write.csv(d, "d.csv")

# Now lets read it back in

  e = read.csv("d.csv")

# Notice there are now rownames in the object
# You can avoid this with

  write.csv(d, "d.csv", row.names = FALSE)
  e = read.csv("d.csv")

# Other ways to read in data

  ?read.table
#  read.table()
#  read.delim("blah.txt", header = TRUE, sep = "\t") # For tab delimited files


# Packages
# One of the coolest things in R is that it is open sourced and you can
# download new analysis techniques from many authors on the fly and incorporate
# it into your work

# There are two steps, install and library

#  install.packages("ggplot2")

  library("ggplot2")
  ??ggplot2  # This allows us to check out the vignettes, or long form documentation
```