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# 1.1 Video:

## Questions all inserted at 10:22

What is the purpose of the R console?   
The console is where…

* code is submitted to be evaluated
* you can locate plots that have been created
* you easily write code to save for later use
* the help file associated with an R function appears

Feedback:

* Right!  Code submitted to the console is evaluated and the result is returned or displayed.
* The Plots/Help tab shows this information.   
  Code submitted to the console is evaluated and the result is returned or displayed.
* This would usually be done in an R script or R Markdown file.  
  Code submitted to the console is evaluated and the result is returned or displayed.
* The Plots/Help tab shows this information.   
  Code submitted to the console is evaluated and the result is returned or displayed

What is the syntax used to store the output of some code in an R object?  
Fill in the blank below:

object summary(vector)

<-,=

Feedback:

Remember you can use either <- or = to store something in an R object.  There are some differences between the functionality.  Generally, it is preferable to use <-.

What is the easiest way to save your code for later use?

* Write it in an R Script or R Markdown file
* Type it into the console and save the submitted code
* Use a text editor that is external to R
* Unfortunately, you can't save R code

Feedback:

* Right!
* While you can save the code submitted in the console, this isn’t optimal as it saves the printed out information as well making it difficult to rerun your code.   
  The easiest method is to write your code in an R script or R Markdown document.
* While you can save the code this way, you lose all of the nice functionality of RStudio!  
  The easiest method is to write your code in an R script or R Markdown document.
* To save your R code, the easiest method is to write your code in an R script or R Markdown document.

TRUE/FALSE: Suppose you ran the code below:

final\_answer <- log(2.1\*4.6/1.9) – 2\*exp(4)  
final\_answer

Each time you type final\_answer into the console, R has to execute the log and exp functions.

* TRUE
* FALSE

Feedback

* Remember that R will store the output of the computation. That means R doesn’t have to reevaluate the code each time you call the final\_answer object.
* Right! R stores the output of the computation.

# 1.2 Video:

## Part 1:

### Vector stuff at 9:44

What is an atomic vector in R?

* One dimensional object whose elements can be of differing types.
* **One dimensional object whose elements are all the same type.**
* Two-dimensional object whose elements are all of the same type
* Two-dimensional object whose elements can be of differing types.

Feedback:

* Atomic vectors are one dimensional but all of the elements must be of the same type (numeric, character, logical, etc.)
* Right!
* An atomic vector has only one dimension (an ordering in only one direction)
* An atomic vector has only one dimension (an ordering in only one direction) and must have all elements of the same type (numeric, character, logical, etc.)

What number is the first element of an atomic vector in R given? (That is, at what index does R start counting?)

1, one

Feedback:

R starts counting at 1 (most languages start counting at 0).  This is important to note for later.  When we want to access certain elements of a vector, we can do so by using the index number.

If you want to look at the help documentation for the "hist" function, what code can you submit to the console?

help(hist), help("hist"), ?hist, ?"hist"

Feedback:

Understanding help files in R is vital for using new R functions!

If you look at the help file for a function and see an argument in the function definition with an = sign and a value next to it, for example myfun(xlimits = c(0, 10), …), what does the value to the right of the equal sign represent?

* If the user doesn’t specify a value for that argument, this is the default value to use.
* The value of the argument any time the function is called.
* An example of what you might put in as the input for that argument but the value isn’t actually used.

Feedback:

* Right!
* The value will be the default value, but can be overridden if the user of the function specifies a value for that argument.
* The value will be the default value, but can be overridden if the user of the function specifies a value for that argument. Often the type of input you’ll use will be similar, but not always.

### Matrix questions at 15:26

What is a matrix in R?

* Two-dimensional object whose elements are all of the same type.
* Two-dimensional object whose elements can be of differing types.
* Two-dimensional object whose columns values are each of the same type.
* Two-dimensional object whose row values are each of the same type.

Feedback:

* Right!
* matrices must be filled with the same type of data (character, numeric, logical, etc.)
* matrices must be filled with the same type of data (character, numeric, logical, etc.)
* matrices must be filled with the same type of data (character, numeric, logical, etc.)

What function is used to manually create a matrix in R? Simply put the name of the function or the name of the function followed by ().  For example, if the answer were 'hist' you can put hist or hist().

matrix, matrix()

Feedback:

None

How does R do basic mathematical operations on a vector or matrix? That is, if I have a numeric vector called vec and run the code vec\*10, how does R execute the multiplication?

* R applies the operation element-wise.
* R applies the operation to only the first element of the matrix or vector.
* R doesn’t allow these kinds of operations on vectors and matrices.
* R does the arithmetic on the average of the vector or matrix and returns that single number.

Feedback

* Right! There are of course ways to do matrix multiplication (%\*%) and do things like compute inner and outer products.
* R will do basic arithmetic in an element-wise fashion.
* R will do basic arithmetic in an element-wise fashion.
* R will do basic arithmetic in an element-wise fashion.

### DF questions at 18:40

Why are data frames often the object we use to store a data set?

Feedback

Many datasets can be thought of as rectangular objects where each column represents a variable measured and each row represents an observation. Both matrices and data frames are rectangular objects making them reasonable choices for storing datasets. However, most datasets have some variables that are numeric and some that are character. As data frames have the added functionality that each column can be of a different type (numeric, logical, character, etc.), they are often ideal for storing a dataset.

What function creates a data frame? Simply put the name of the function or the name of the function followed by ().  For example, if the answer were 'hist' you can put hist or hist().

data.frame, data.frame()

Feedback

None

### List questions at 20:44

What function creates a list? Simply put the name of the function or the name of the function followed by ().  For example, if the answer were 'hist' you can put hist or hist().

list, list()

Feedback

None

Why are lists considered one dimensional when they can contain matrices or data frames within them?

* Each element of a list can be any R object but we associate an ordering with these elements.
* We ignore the second dimension associated with matrices and data frames when they are put into a list.
* Matrices and data frames are “flattened” to spread the elements into a one dimensional object.

Feedback

* Right!
* There is an ordering associated with each element of the list. Even though the elements can be multi-dimensional, we only care about the ordering of the elements.
* There is an ordering associated with each element of the list. Even though the elements can be multi-dimensional, we only care about the ordering of the elements.

### End video at 21:32

## Part 2

### Vector and Matrix Questions at 7:58

Suppose the following R code is run:

vec <- c(1, 4, 10, -5)

What syntax would you use to return the third element of vec?

vec[3], vec[[3]]

Feedback

None

How can you return more than one element from a vector?

* Provide an indexing vector with the [] function.
* R can’t return more than one element of a vector.
* Use multiple calls to the [] function (ex: vec[3][4][10])

Feedback

* Right!
* You can provide a vector of indices that you want to return. vec[c(1,4,5)] for instance.
* You can provide a vector of indices that you want to return. vec[c(1,4,5)] for instance.

How could you return the element in the third row and 2nd column of an R matrix called mat?

* mat[3, 2]
* mat[2, 3]
* mat(3, 2)
* mat(2, 3)

Feedback

* Right!
* Remember, R does rows by columns so you should put the row index first and column index second.
* The square bracket is a special function that is used to subset common data objects.
* The square bracket is a special function that is used to subset comon data objects and R does rows by columns.  This means you should put the row index first and the column index second.

What does providing a negative sign prior to an indexing vector do when subsetting?

* Returns all elements/rows/columns except those indicated by the indexing vector.
* Returns only the elements/rows/columns indicated by the indexing vector.
* Removes the elements/rows/columns indicated from the original object and overwrites that object.

Feedback

* Right!
* The negative sign will instruct R to “not” return the values indicated.
* The negative sign will instruct R to “not” return the values indicated.

### Data frame and list questions at 16:40

What operator is the most common way to grab a single column from a data frame? (This operator goes directly after the data frame and prior to the column name.)

$, dollar sign

What kind of object is returned if you run the code iris[2, ]?

data frame, dataframe, Data Frame, Data frame, data.frame

Suppose we have a list named myList. What is the difference between running

myList[[1]]

and

myList[1]

?

Feedback

The single bracket doesn’t simplify what is returned. That is, it will return a list (or data frame if you use it to subset a data frame) with just the first list element. The double bracket simplifies in that it doesn’t return a list with the element in it, just the element itself.

# Homework Notes

Put something about this in the homework! Note there are differences between how <- and = behave. In R you can do a shorthand to create multiple objects of the same type

Note that vectors can be one of a few different modes such as "integer," "numeric," "character," and "logical".

In the install module, discuss what R and RStudio are and their relationship…

What is the relationship between R and R Studio?

Something about how lists are vectors (but not atomic)