Variables: Objects in R

Basic R Functionality

Introduction to R for Public Health Researchers

Common new users frustations

- 1. Different versions of software
- 2. Data type problems (is that a string or a number?)
- 3. Working directory problems: trying to read files that R "can't find"
 - · RStudio can help, and so do RStudio Projects
 - discuss in Data Input/Output lecture
- 4. Typos (R is case sensitive, x and x are different)
 - RStudio helps with "tab completion"
 - discussed throughout

Getting Started

- · You should have the latest version of R installed!
- · Open RStudio
- Files -> New -> R Script
- · Save the blank R script in a directory of your choosing
- · Add a comment header

Commenting in Scripts

Add a comment header to day1.R:# is the comment symbol

Explaining output on slides

In slides, a command (we'll also call them code or a code chunk) will look like this

```
print("I'm code")
```

```
[1] "I'm code"
```

And then directly after it, will be the output of the code.

So print ("I'm code") is the code chunk and [1] "I'm code" is the output.

2 + 2

[1] 4

2 * 4

[1] 8

2 ^ 3

[1] 8

Note, when you type your command, R inherently thinks you want to print the result.

- The R console is a full calculator
- Try to play around with it:
 - +, -, /, * are add, subtract, divide and multiply
 - ^ or ** is power
 - parentheses (and) work with order of operations

[1] 38

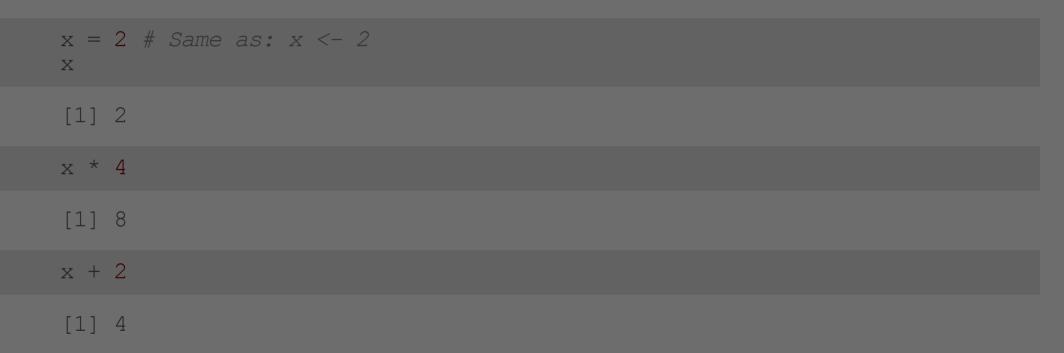
$$(1 + 3) / 2 + 45$$

[1] 47

Try evaluating the following:

- 2 * 3 / 4 * 2
- 2^4 1

- You can create variables from within the R environment and from files on your computer
- R uses "=" or "<-" to assign values to a variable name
- · Variable names are case-sensitive, i.e. X and x are different



- The most comfortable and familiar class/data type for many of you will be data.frame
- You can think of these as essentially Excel spreadsheets with rows (usually subjects or observations) and columns (usually variables)

- · data.frames are somewhat advanced objects in R; we will start with simpler objects;
- · Here we introduce "1 dimensional" classes; often referred to as 'vectors'
- Vectors can have multiple sets of observations, but each observation has to be the same class.

```
class(x)

[1] "numeric"

y = "hello world!"

print(y)

[1] "hello world!"

class(y)

[1] "character"
```

Try assigning your full name to an R variable called name

Try assigning your full name to an R variable called name

```
name = "John Muschelli"
name

[1] "John Muschelli"
```

The 'combine' function

The function c () collects/combines/joins single R objects into a vector of R objects. It is mostly used for creating vectors of numbers, character strings, and other data types.

```
x <- c(1, 4, 6, 8)
x

[1] 1 4 6 8

class(x)

[1] "numeric"</pre>
```

The 'combine' function

Try assigning your first and last name as 2 separate character strings into a single vector called name2

The 'combine' function

Try assigning your first and last name as 2 separate character strings into a length-2 vector called name2

```
name2 = c("John","Muschelli")
name2
[1] "John" "Muschelli"
```

length(): Get or set the length of vectors (including lists) and factors, and of any other R object for which a method has been defined.

```
length(x)

[1] 4

y

[1] "hello world!"

length(y)

[1] 1
```

What do you expect for the length of the name variable? What about the name 2 variable?

What are the lengths of each?

What do you expect for the length of the name variable? What about the name 2 variable?

What are the lengths of each?

length (name)

[1] 1

length(name2)

[1] 2

You can perform functions to entire vectors of numbers very easily.

x + 2

[1] 3 6 8 10

x * 3

[1] 3 12 18 24

x + c(1, 2, 3, 4)

[1] 2 6 9 12

But things like algebra can only be performed on numbers.

```
> name2 + 4
[1] Error in name2 * 4 : non-numeric argument
to binary operator
```

And save these modified vectors as a new vector.

```
y = x + c(1, 2, 3, 4)
y
[1] 2 6 9 12
```

Note that the R object y is no longer "Hello World!" - It has effectively been overwritten by assigning new data to the variable

· You can get more attributes than just class. The function str gives you the structure of the object.

```
str(x)
num [1:4] 1 4 6 8
str(y)
num [1:4] 2 6 9 12
```

This tells you that x is a numeric vector and tells you the length.

Review

- Creating a new script
- Using R as a calculator
- Assigning values to variables
- · Performing algebra on numeric variables

Website

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