

6. Control structures and functions in R

Principles of Data Science with R

Dr. Uma Ravat

PSTAT 10

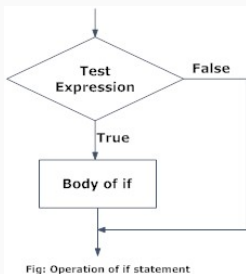
Announcement

1. **Quiz 2** tomorrow.
 - Do not discuss quiz anywhere while quiz is in progress
 - No collaboration or discussion of any kind allowed.
2. For help in course material , please use **ULA/TA/instructor office hours** and Ed discussion
3. By class poll: In Thanksgiving week, Lecture(Tuesday), sections (Tuesday, Wednesday) will be offered via zoom
4. Please follow email policy:
 - only for questions of private nature
 - For worksheet, Hw, quiz issues, extensions etc first contact TA via private Ed post
 - contact HeadTA for accomodations
 - do not post on Ed and also send private ed or email or both message

Control flow

Control flow is the order in which individual statements (lines of code) of an R program are executed or evaluated

A *control flow statement* is a statement whose execution results in a choice being made as to which of two or more paths should be followed



Control flow (or alternatively, flow of control)

1. Conditionals
2. Iteration/looping

Conditionals in everyday language:

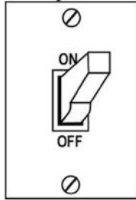
If you commit a crime



Then you go to jail



If I flip on the switch



Then the lights go on



Motivation: Conditionals in math, data science

$$|x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{if } x < 0 \end{cases}$$

if the country code is not "US", multiply prices by current exchange rate

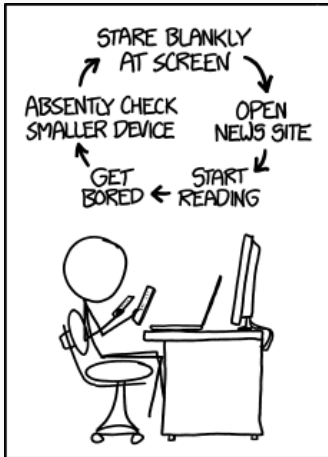
How can you code this in R?

None of the constructs we've seen so far (data type, data structures, logical operators, plotting or any functions), allow us to write code that will make the computer execute such statements.

Need a way to tell the computer "If $x > 0$ do this... otherwise do that..."

We can do that with the **conditionals control structure**.

Iteration/looping in life



Motivation for Iteration/looping in this class!

How will you plot graph of $y = \log(x) + x^2$ in R?

Motivation for Iteration/looping in this class!

How will you plot graph of $y = \log(x) + x^2$ in R?

Generate the values for x and y first and give these vectors to `plot()` fnction.

x	$y = f(x) = \log(x) + x^2$
1	$\log(1) + 1^2 = 1$
2	$\log(2) + 2^2 = 4.6931472$
...	...
100	$\log(100) + 100^2 = 1.0004605 \times 10^4$

- Need to repeat similar actions multiple times

Motivation for Iteration/looping in this class!

Need constructs that **allow us to succinctly repeat a similar action multiple times.**

We can do that with **the iteration/looping control structure** in R

We can also do it by **writing a user-defined function and calling our function on different input values.**

calling our function on different input values will actually use an iteration/looping control structure!

Control structures and functions tutorial

- Conditionals : `if()`
 - `if... else .. , ifelse`
- Iteration/looping: `for()` , `while()`, `return()`
- user-defined functions.

Your job is to learn the syntax and develop an acumen to choose the best control structure/function for a given situation.

→