

Foundations of Data Analysis

The University of Texas at Austin

R Tutorials: Week 1

Functions and Objects

In this R tutorial, we'll introduce common functions. Functions are words or characters that R already recognizes as something that it's going to be able to do for you. Functions always contain at least one argument, which is going to be submitted in between a set of parentheses. So for example, the square root function. If I want to take the square root of a number, I'm going to tell R `SQRT` and then open a set of parentheses. Notice that R automatically gives you that closing parentheses just to save you that one keystroke worth of time. And the square root function just requires one argument, which is the number you want to take the square root of. So if I want to take the square root of 25, I can submit this function and it returns the answer.

```
sqrt(25)
```

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

This might be a good time to mention that R is case sensitive. So if you remember the square root function as being `SQRT`, but say you capitalize the S and then try and submit this, R only ran the square root function in this line because it recognized lowercase `SQRT` as an existing function, and it was able to call that function up and do the calculation. Because capital S is different from lowercase S in R— it is case sensitive— it's not going to recognize this function. So if I try and run this line, ...

```
Sqrt(25)
```

```
## Error in eval(expr, envir, enclos): could not find function "Sqrt"
```

... it's going to say, hey, I couldn't find this function uppercase `SQRT`. It's not smart enough to really know that that's what you meant. So if you see this error, check your capitalization, check your spelling, and just make sure that you're entering the function name correctly. Now I know this function `SQRT` takes one argument and it returns the square root of that number because I've used R before. But if you don't know what a function is going to do, you can ask for it to return that information by using the help feature. So if I want to find out what `SQRT` is doing, I can start by putting a question mark and then the function name.

```
?sqrt
```

Now if I submit this, this help window ... is going to pop up.

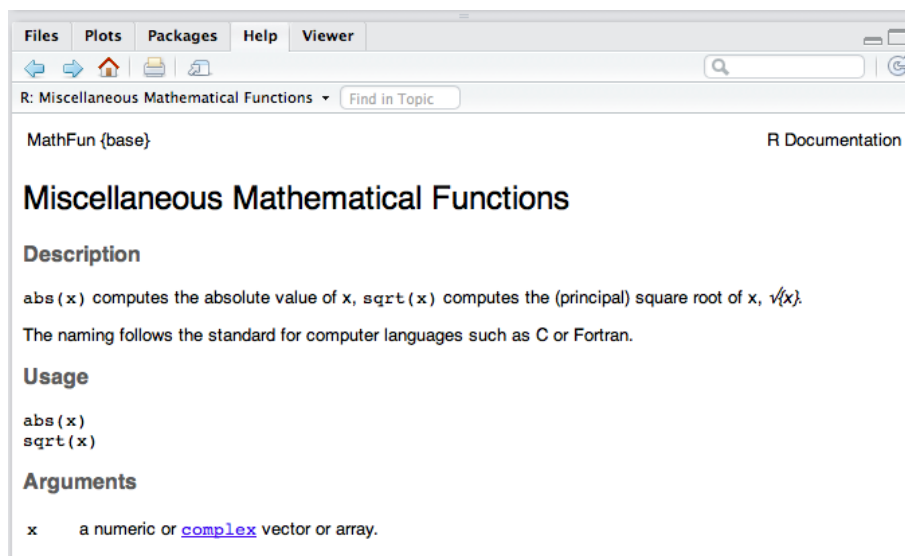


Figure 1: Help window in RStudio.

And it's going to give me a description, some examples, what arguments it takes, for whatever function you submit. So in order to talk about some of the other common functions we're going to be using, let's first go over how to assign an object in R. So for example, if I want to define some number, x , and I want that x to be equal to the value 5, I'm going to use the assignment key in R, which is basically a backwards arrow. You're going to put whatever you want it to be called on the left side of that arrow, and you're going to put whatever you want that object to contain on the right side.

```
x <- 5
```

So if I submit this line of code, 5 being assigned to x , a couple things are going to happen. Of course that line is going to be submitted to my console. Nothing is returned in the console because I didn't ask for anything to be returned. All I wanted to do is assign this value to this label x . Now if we look over ... in the environment or workspace window [of RStudio], we're going to see something pop up in our workspace.

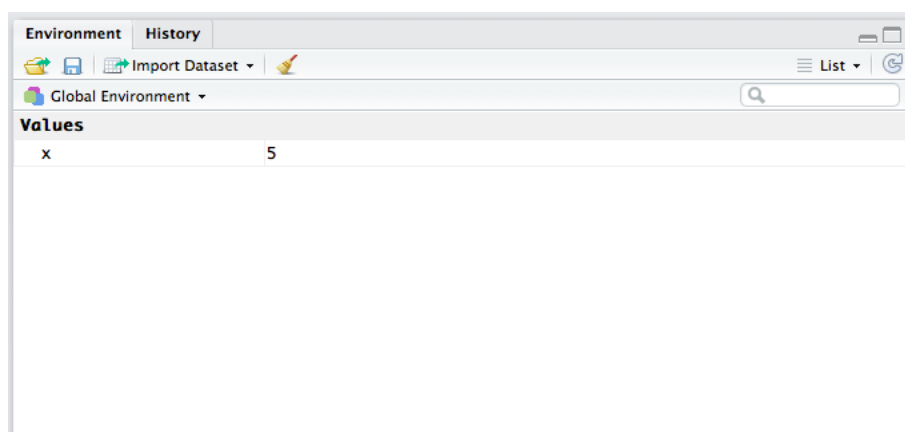


Figure 2: RStudio environment window.

Because now R is recognizing that this letter x is basically a label housing whatever value we assign to it. Right. So if I now ask for x plus 2, it's going to know that x is 5 and it's going to return to me that 5 plus 2 is equal to 7.

```
x + 2
```

```
## [1] 7
```

Now, I can assign more than just a number to an object. I can actually ask for some function of a number to be assigned to whatever I want. So for example, if I wanted to store, in a letter y, the the value of x squared—right, I’ve already defined x so R already knows what that means—I can do an arithmetic operation on x, store it in y, ...

```
y <- x^2  
y
```

```
## [1] 25
```

I can now use either y or x in any sort of function, such as the square root of y, and R is going to be able to recognize that.

```
sqrt(y)
```

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

Again, remember that R is case sensitive. So if I asked for the square root of capital Y, it’s not going to see capital Y as an object that I’ve defined, and it’s going to let me know with a nice red error down here.