

1.3: What is R?

R is a computer language developed specifically for statistical computing. It is actually more than that, though. R provides a complete environment for interacting with your data. You can directly use the functions that are provided in the environment to process your data without writing a complete program. You also can write your own programs to perform operations that do not have built-in functions, or to repeat the same task multiple times, for instance.

R is an **object-oriented language** that uses vectors and matrices as its basic operands. This feature makes it quite useful for working on large sets of data using only a few lines of code. The R environment also provides excellent graphical tools for producing complex plots relatively easily. And, perhaps best of all, it is free. It is an open source project developed by many volunteers. You can learn more about the history of R, and download a copy to your own computer, from the R Project web site [13].

As an example of using R, here is a copy of a simple interaction with the R environment.

```
> x x [1] 2 4 6 8 10 12 14 16 > mean(x)
[1] 9 > var(x) [1] 24 >
```

In this listing, the “>” character indicates that R is waiting for input. The line `x <- c(2, 4, 6, 8, 10, 12, 14, 16)` concatenates all of the values in the argument into a vector and assigns that vector to the variable `x`. Simply typing `x` by itself causes R to print the contents of the vector. Note that R treats vectors as a matrix with a single row. Thus, the “[1]” preceding the values is R’s notation to show that this is the first row of the matrix `x`. The next line, `mean(x)`, calls a function in R that computes the arithmetic mean of the input vector, `x`. The function `var(x)` computes the corresponding variance.

This book will not make you an expert in programming using the R computer language. Developing good regression models is an interactive process that requires you to dig in and play around with your data and your models. Thus, I am more interested in using R as a computing environment for doing statistical analysis than as a programming language. Instead of teaching you the language’s syntax and semantics directly, this tutorial will introduce what you need to know about R as you need it to perform the specific steps to develop a regression model. You should already have some programming expertise so that you can follow the examples in the remainder of the book. However, you do not need to be an expert programmer.

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