

A Gentle Introduction to R

EXTRAS

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Matrix math

- R can do *matrix math* — which are uses in many statistical procedures
 - ▶ But the *syntax* is different from the usual math operators
- Using a regular multiplication symbol (*) results in *element*-wise multiplication
 - ▶ each *element* (item) in matrix1 is multiplied by the corresponding *element* in matrix2, etc.

```
c(1, 2, 3) * c(3, 2, 1)
```

- *Matrix multiplication* is specified by this operator: %*%

```
c(1, 2, 3) %*% c(3, 2, 1)
```

Symbolic Variables

- You can store values (*objects*) in symbolic variables (*names*) using an *assignment operator*

| | |
|----|---|
| -> | assign the <i>value</i> on the left to the <i>name</i> on the right |
| <- | assign the <i>value</i> on the right to the <i>name</i> on the left |
| = | assign the <i>value</i> on the right to the <i>name</i> on the left |

- '<-' is preferred, because it is unambiguous (to people *and* to R)
- '=' is not allowed in certain situations (e.g., when surrounded by other expressions)
 - ▶ '=' is also used to set *argument values* in *function calls*, which is a different meaning and its most common use.
- You can also use the `assign` *function* (advanced):

```
assign('x', 3)      # assign the value 3 to the variable 'x'
```

Variable / Object Names

- In R, all variables are *objects*
 - ▶ In R, **everything** is an *object*
- Object names can include:
(depending on the language or *locale*)

| | |
|-------------|---------|
| letters | a-z A-Z |
| numbers | 0-9 |
| periods | . |
| underscores | _ |

- Names *should begin with a letter*

```
A <- 10
B = 10 * 10
log(A) -> A_log
B.seq <- 1:B
assign('x', 3)
```

Object Names: Details

Names can start with a **letter** or a **period** (*more on this later*)

```
myvar <- T  
.myvar <- T
```

but anything else triggers an **error**

```
Omyvar <- F  
_myvar <- F  
my var <- F
```

For more information about object names in R, see:

- Section 1.8 of 'An Introduction to R'
- Section 2.1.3 of 'The R Language Definition'

Object Names: Hidden

- Names starting with a period (.) are special and normally hidden from users.

```
ls()  
ls(all.names = TRUE)
```

- Names starting with a period are used by packages or the system for special objects that users should not interact with directly.
- Such objects may not behave as expected with common commands, such as `ls()` (above).
- Therefore, most users should avoid doing this unless they know what they are doing and have a good reason to do so.

Object Names: Advanced

- 'Valid' names following the rules above can be referred to easily in code.
- Names with any character are actually possible, but must be quoted with backticks (`)`
 - ▶ **This is not recommended practice**, but occasionally useful when you need to refer to an element of an object, such as list items or data frame columns, that have non-standard names.

```
`(my) [strange] {variable} 'name' "!@# $"` <- T  
print(`(my) [strange] {variable} 'name' "!@# $"`)
```

```
## [1] TRUE
```