short R tutorial

Adler, 2012

Following is the R tutorial from Adler, 2012, Chapter 3. I'll verbally explain the steps as we go along but you can always refer to the book for a more detailed explanation.

Numbers

```
1+2+3
```

```
## [1] 6
```

```
1+2*3
```

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

```
(1+2)*3
```

```
## [1] 9
```

Vectors

```
c(0,1,1,2,3,5,8)
```

```
## [1] 0 1 1 2 3 5 8
```

```
1:50
```

```
##  [1]  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
## [26] 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50
```

```
c(1,2,3,4) + c(10,20,30,40)
```

```
## [1] 11 22 33 44
```

```
c(1,2,3,4) * c(10,20,30,40)
```

```
## [1]  10  40  90 160
```

```r
c(1,2,3,4) + 1
```

```
## [1] 2 3 4 5
```

```r
1/c(1,2,3,4,5)
```

```
## [1] 1.0000000 0.5000000 0.3333333 0.2500000 0.2000000
```

```r
c(1,2,3,4) + c(10,100)
```

```
## [1]  11 102  13 104
```

```r
# this one generates an error message
c(1,2,3,4,5) + c(10,100)
```

```
## Warning in c(1, 2, 3, 4, 5) + c(10, 100): longer object length is not a multiple
## of shorter object length
```

```
## [1]  11 102  13 104  15
```

Character Vectors

```r
"Hello world!"
```

```
## [1] "Hello world!"
```

```r
c("Hello world","Hello R")
```

```
## [1] "Hello world" "Hello R"
```

Functions

```r
exp(1)
```

```
## [1] 2.718282
```

```r
cos(3.141593)
```

```
## [1] -1
```

```r
log2(1)
```

```
## [1] 0
```

```r
log(x=64,base=4)
```

```
## [1] 3
```

```r
log(64,4)
```

```
## [1] 3
```

Operators

```r
17 + 2
```

```
## [1] 19
```

```r
2 ^ 10
```

```
## [1] 1024
```

```r
3 == 4
```

```
## [1] FALSE
```

Variables

```r
x <- 1

y <- 2

z <- c(x,y)

z
```

```
## [1] 1 2
```

```r
y <- 4

z
```

```
## [1] 1 2
```

```r
j <- c(1:12)

j
```

```
##  [1]  1  2  3  4  5  6  7  8  9 10 11 12
```

```r
j[7]
```

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

```r
j[1:6]
```

```
## [1] 1 2 3 4 5 6
```

```r
j[j %% 3 == 0]
```

```
## [1]  3  6  9 12
```

```r
k <- j

k[j %% 3 == 0] <- 'x'

k[j %% 3 == 0] <- 1:4

j <- c(12:1)

j[c(1,6,11)]
```

```
## [1] 12  7  2
```

```r
j %% 3 == 0
```

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

```r
j[j %% 3 == 0]
```

```
## [1] 12  9  6  3
```

Assignment operators

```r
x <- 1

y <- 2

x = y

x
```

```
## [1] 2
```

```
y
```

```
## [1] 2
```

```
x == y
```

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

```
x <- 1

y <- 2

x == y
```

```
## [1] FALSE
```

```
3 -> z

z
```

```
## [1] 3
```

Functions

```
f <- function(x,y) {c(x+1,y+1)}

f(1,2)
```

```
## [1] 2 3
```

```
f
```

```
## function(x,y) {c(x+1,y+1)}
```

Data structures

```
a <- array(c(1:12), dim=c(3,4))

a
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    1    4    7   10
## [2,]    2    5    8   11
## [3,]    3    6    9   12
```

```r
a[2,2]
```

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

```r
v <- c(1:12)

v
```

```
##  [1]  1  2  3  4  5  6  7  8  9 10 11 12
```

```r
m <- matrix(data=c(1:12),nrow=3,ncol=4)

m
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    1    4    7   10
## [2,]    2    5    8   11
## [3,]    3    6    9   12
```

```r
w <- array(c(1:18),dim=c(3,3,2))

w
```

```
## , , 1
##
##      [,1] [,2] [,3]
## [1,]    1    4    7
## [2,]    2    5    8
## [3,]    3    6    9
##
## , , 2
##
##      [,1] [,2] [,3]
## [1,]   10   13   16
## [2,]   11   14   17
## [3,]   12   15   18
```

```r
a[1,2]
```

```
## [1] 4
```

```r
a[1:2,1:2]
```

```
##      [,1] [,2]
## [1,]    1    4
## [2,]    2    5
```

```r
a[1,]
```

```
## [1]  1  4  7 10
```

```r
a[,1]
```

```
## [1] 1 2 3
```

```r
a[1:2,]
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    1    4    7   10
## [2,]    2    5    8   11
```

```r
a[c(1,3),]
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    1    4    7   10
## [2,]    3    6    9   12
```

```r
e <- list(thing="hat",size="8.25")

e
```

```
## $thing
## [1] "hat"
##
## $size
## [1] "8.25"
```

```r
e$thing
```

```
## [1] "hat"
```

```r
e[1]
```

```
## $thing
## [1] "hat"
```

```r
e[[1]]
```

```
## [1] "hat"
```

```r
g <- list("this list references another list",e)

g
```

```
## [[1]]
## [1] "this list references another list"
##
## [[2]]
## [[2]]$thing
## [1] "hat"
##
## [[2]]$size
## [1] "8.25"
```

```r
# a data frame is a list containing multiple named vectors of the same length

teams <- c("PHI","NYM","FLA","ATL","WSN")

w <- c(92,89,94,72,59)

l <- c(70,73,77,90,102)

nleast <- data.frame(teams,w,l)

nleast
```

```
##   teams  w   l
## 1   PHI 92  70
## 2   NYM 89  73
## 3   FLA 94  77
## 4   ATL 72  90
## 5   WSN 59 102
```

```r
nleast$w
```

```
## [1] 92 89 94 72 59
```

```r
nleast$teams == "FLA"
```

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

```r
nleast$l[nleast$teams=="FLA"]
```

```
## [1] 77
```

Objects and Classes

```r
class(teams)
```

```
## [1] "character"
```

```r
class(w)
```

```
## [1] "numeric"
```

```r
class(nleast)
```

```
## [1] "data.frame"
```

```r
class(class)
```

```
## [1] "function"
```

```r
# + is a generic function for adding objects
17 + 6
```

```
## [1] 23
```

```r
as.Date("2009-09-08") + 7
```

```
## [1] "2009-09-15"
```

```r
x <- 1 + 2 + 3 + 4

# When you type the name of an object, R calls print() on it
x
```

```
## [1] 10
```