Basic Introduction to R

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Simple calculations

Results of expressions are printed; assignments are not

```
# Circumference and area of a circle of radius=3
2 * pi * 3
```

```
## [1] 18.84956
```

```
pi * 3^2
```

```
## [1] 28.27433
```

```
# Assigning variables
radius <- 3
circumference <- 2 * pi * radius
circumference
```

```
## [1] 18.84956
```

```
# Assign, and print
(area <- pi * radius^2)
```

```
## [1] 28.27433
```

```
area/circumference
```

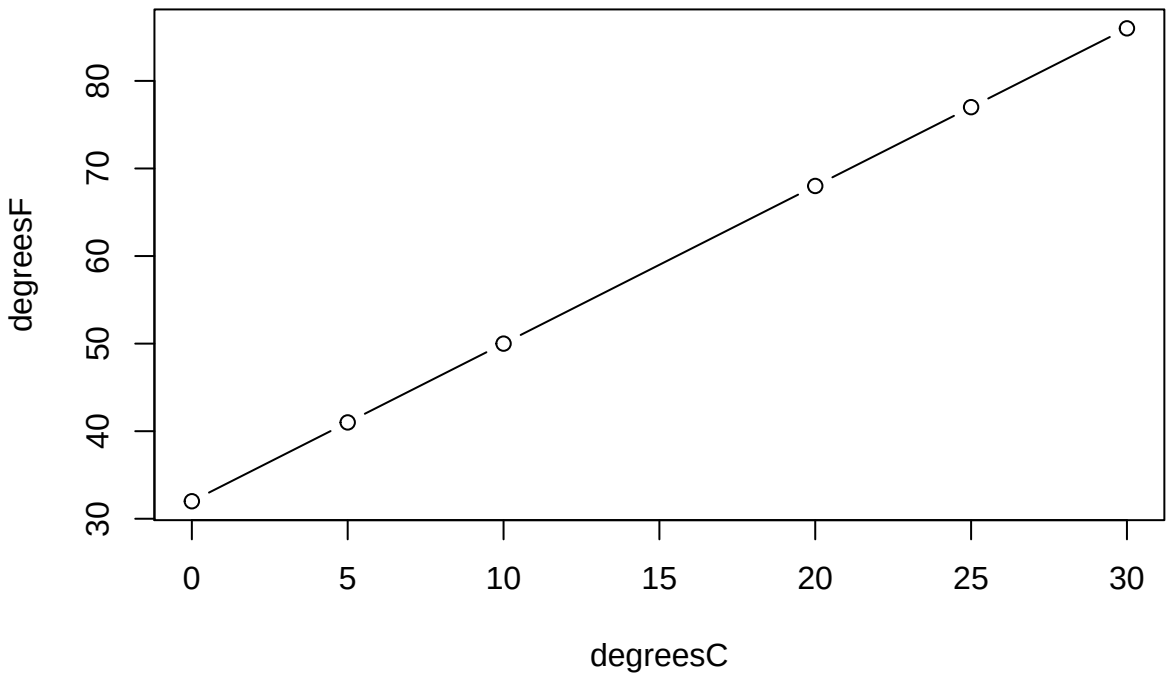
```
## [1] 1.5
```

Vectors

```
degreesC <- c(0, 5, 10, 20, 25, 30)
degreesF <- (9/5) * degreesC + 32
degreesF
```

```
## [1] 32 41 50 68 77 86
```

```
# a simple plot(x,y)
plot(degreesC, degreesF, type="b")
```



shorthand functions: :, seq(), rep()

```
1:10
```

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

```
10:1
```

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

```
seq(1, 10)
```

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

```
seq(1, 5, by=0.5)
```

```
## [1] 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
```

```
rep(1:4, times=2)
```

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

```
rep(1:4, each=2)
```

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

Matrices

matrix(values, nrow, ncol) reshapes the values with nrow rows and ncol columns

```
(matA <- matrix(1:8, nrow=2, ncol=4))
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    1    3    5    7
## [2,]    2    4    6    8
```

```
(matB <- matrix(1:8, nrow=2, ncol=4, byrow=TRUE))
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    1    2    3    4
## [2,]    5    6    7    8
```

row and column labels: dimnames()

```
dimnames(matA) <- list(sex=c("M", "F"), group=LETTERS[1:4])
matA
```

```
##    group
## sex A B C D
##   M 1 3 5 7
##   F 2 4 6 8
```

see the structure of an R object

```
str(matA)
```

```
##  int [1:2, 1:4] 1 2 3 4 5 6 7 8
##  - attr(*, "dimnames")=List of 2
##   ..$ sex  : chr [1:2] "M" "F"
##   ..$ group: chr [1:4] "A" "B" "C" "D"
```

Arrays

array(values, dim) reshapes values into an array with dimensions dim

```
arrayA <- array(1:16, dim=c(2,4,2))  # 2 rows, 4 columns, 2 layers
arrayA
```

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

```
str(arrayA)
```

```
##  int [1:2, 1:4, 1:2] 1 2 3 4 5 6 7 8 9 10 ...
```

```
# assign dimension names
dimnames(arrayA) <- list(sex = c("M", "F"),
                         group = letters[1:4],
                         time = c("Pre", "Post"))
arrayA
```

```
## , , time = Pre
##
##    group
## sex a b c d
##   M 1 3 5 7
##   F 2 4 6 8
##
## , , time = Post
##
##    group
## sex  a  b  c  d
##   M  9 11 13 15
##   F 10 12 14 16
```

```
str(arrayA)
```

```
##  int [1:2, 1:4, 1:2] 1 2 3 4 5 6 7 8 9 10 ...
##  - attr(*, "dimnames")=List of 3
##   ..$ sex  : chr [1:2] "M" "F"
##   ..$ group: chr [1:4] "a" "b" "c" "d"
##   ..$ time : chr [1:2] "Pre" "Post"
```