R Statistical computing

START HERE

R
Start interactive session

summary(df)
Quick statistics

x ← c(1, 2, 3)
Make a vector

df[df$*<col>* > 5,]
Filter rows

df ← *read.csv("<file>")*
Load a CSV

?*<topic>*
Open help page

str(df)
Inspect structure

Rscript *<file.R>*
Run a script

Vector one type → **names + dims** → **List** mixed types → **equal-length columns** → **Data frame** table of columns → **model / plot** → **Result** print or write

CONCEPTS

Almost everything is a vector; a single number is a vector of length 1. Operations work on whole vectors at once.

Indexing starts at 1, and negative indices drop elements: x[-1] is everything but the first.

← assigns, == compares. = also assigns at top level but only names arguments inside calls.

RUNNING R

R
Start an interactive session

Rscript *<file.R>* [args]
Run a script non-interactively

Rscript -e '*<expr>*'
Evaluate an expression and exit

R --vanilla
Ignore profile, site and saved state
Short for --no-save --no-restore --no-site-file --no-init-file --no-environ. Use it to rule out your own startup files.

R --no-save
Do not offer to save the workspace

commandArgs(trailingOnly = TRUE)
Script arguments as a character vector

q()
Quit the session

source("*<file.R>*")
Run a script inside a session

HELP AND PACKAGES

?*<topic>*
Open the help page for a function

??*<term>*
Search all help pages

example(*<fn>*)
Run the examples from a help page

apropos("*<part>*")
List objects matching a name part

install.packages("*<pkg>*")
Install from CRAN

library(*<pkg>*)
Attach an installed package

<pkg>*::*<fn>
Call a function without attaching

HELP AND PACKAGES (cont.)

update.packages()
Update installed packages

VECTORS

c(1, 2, 3)
Combine values into a vector

1:10
Integer sequence

seq(0, 1, by = 0.25)
Sequence with a step

seq_len(*<n>*)
1..n, safe when n is 0

rep(*<x>*, times = 3)
Repeat values

length(*<x>*)
Number of elements

x[3]
Third element

x[c(1, 3)]
Several elements by position

x[x > 5]
Elements matching a condition

x[-1]
Everything except the first

x["*<name>*"]
Element by name

names(x) ← c("a", "b")
Set element names

which(x > 5)
Positions where TRUE

%in%
Membership test: x %in% y

sort(x) / order(x)
Sorted values / sorting positions

unique(x)
Drop duplicates

table(x)
Count each value

is.na(x)
Test for missing values

ifelse(*<test>*, *<yes>*, *<no>*)
Vectorised if/else

paste("a", "b", sep = "-")
Join strings

paste0("a", "b")
Join without separator

DATA STRUCTURES

list(a = 1, b = "x")
List of mixed types

l$a / l[["a"]]
Element of a list

matrix(1:6, nrow = 2)
Matrix, filled by column

DATA STRUCTURES (cont.)

factor(x, levels = c("lo", "hi"))
Categorical vector

class(x) / typeof(x)
Class / internal type

str(x)
Compact structure of any object

as.numeric(x)
Convert type (also as.character, as.integer)

DATA FRAMES

data.frame(a = 1:3, b = c("x", "y", "z"))
Build a data frame

head(df, *<n>*)
First rows

nrow(df) / ncol(df)
Row / column count

names(df)
Column names

summary(df)
Per-column statistics

df$*<col>*
One column as a vector

df[*<rows>*, *<cols>*]
Rows and columns by index or name

df[df$*<col>* > 5,]
Filter rows

df[order(df$*<col>*),]
Sort rows

df$*<new>* ← df$a * 2
Add a column

merge(df1, df2, by = "*<key>*")
Join two frames on a key

aggregate(a ~ g, data = df, FUN = mean)
Group and summarise

CONTROL AND FUNCTIONS

f ← function(x, y = 2) { x + y }
Define a function

if (*<cond>*) { } else { }
Conditional

for (i in *<seq>*) { }
Loop over a sequence

x |> f()
Native pipe: f(x) (R 4.1+)

tryCatch(*<expr>*, error = function(e) *<h>*)
Handle errors

print(x) / cat("a", x, "\n")
Print object / plain text

APPLY FAMILY

sapply(x, f)
Apply, simplify to vector or matrix

lapply(x, f)
Apply, always return a list

vapply(x, f, numeric(1))
Apply with a checked result type

apply(m, 1, sum)
Over rows (2 for columns) of a matrix

mean(x, na.rm = TRUE)
Mean ignoring NA

sd(x) / median(x) / quantile(x)
Spread and location

IMPORT AND EXPORT

read.csv("*<file>*")
Read a CSV into a data frame

write.csv(df, "*<file>*", row.names = FALSE)
Write a data frame as CSV

saveRDS(x, "*<file>*.rds")
Save one object

readRDS("*<file>*.rds")
Load one object

getwd() / setwd("*<dir>*")
Show / change working directory

PLOTTING

plot(x, y)
Scatter plot

hist(x)
Histogram

plot(x, y, main = "*<t>*", xlab = "*<x>*", col = "red")
Title, label and colour

pdf("*<file>*.pdf")
Send plots to a PDF; end with dev.off()

dev.off()
Close the current graphics device

RECIPES

Script with an argument

```
# run: Rscript top.R data.csv 5
args ←
commandArgs(trailingOnly =
TRUE)
df ← read.csv(args[1])
print(head(df,
as.integer(args[2])))
```

Summarise by group

```
df ← read.csv("sales.csv")
res ← aggregate(amount ~
region, data = df, FUN = sum)
res ← res[order(-
res$amount), ]
write.csv(res, "by_region.csv",
row.names = FALSE)
```