

Homework: Introduction to R

This homework sheet will test your knowledge of basic R commands.

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- a) Assign the value 15 to a variable x and create a vector y with the values $[1, 2, 3, 10, 100]$. Multiply those vectors component-wise and save the result in an object z . Calculate the sum of all elements in z .

Solution:

```
x <- 15
y <- c(1, 2, 3, 10, 100)
z <- x * y
sum(z)

## [1] 1740
```

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- b) Generate a sequence from 0 to 10 and a sequence from 5 to -5 .

Solution:

```
0:10

## [1] 0 1 2 3 4 5 6 7 8 9 10

5:-5

## [1] 5 4 3 2 1 0 -1 -2 -3 -4 -5
```

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- c) Generate a sequence from -3 to 3 by 0.1 steps.

Solution:

```
x <- (-30:30)/10
```

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- d) Define two vectors with the following data: t includes the strings "mon", "tue", "wed", "thu", "fri", "sat"; and m includes $[90, 80, 50, 20, 5, 20]$. Concatenate both vectors column-wise into a matrix with 5 rows and 2 columns and save this a a new object named `study`.

Solution:

```
t <- c("mon", "tue", "wed", "thu", "fri", "sat")
m <- c(90, 80, 50, 20, 5, 20)
study <- as.data.frame(cbind(t, m))
```

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e) Create the following data frame:

age	sex	height	weight
21	m	181	69
35	f	173	58
829	m	171	75
2	e	166	60

Calculate the minimum and maximum value in the column *age*. Obviously, there have been some issues collecting the data. Generate a variable *selection* that contains the result to the logical query of *age under 20 and above 80*. Use this variable to set the age observations to NA if age is under 20 or above 80.

Calculate the Body Mass Index (BMI)

$$BMI = \frac{\text{Weight in kg}}{\text{Length in m}}$$

of all people from the previous data frame. Store the results in a variable *BMI* and append it to your data frame. Round the resulting values.

Solution:

```
data <- (cbind(c(21, 35, 829, 2), c("m", "f", "m", "e"), c(181, 173, 171, 166),
  c(69, 58, 75, 60)))

colnames(data) <- c("age", "sex", "height", "weight")

data.frame(data)

##   age sex height weight
## 1  21  m   181     69
## 2  35  f   173     58
## 3 829  m   171     75
## 4   2  e   166     60

selection <- (data[, 1] < 20) | (data[, 1] > 80)

data[, 1][selection == TRUE] <- NA

data.frame(data)
```

```
##      age sex height weight
## 1   21  m   181     69
## 2   35  f   173     58
## 3 <NA> m   171     75
## 4 <NA> e   166     60

BMI <- round(as.numeric(data[, 4]) / (as.numeric(data[, 3]) / 100)^2)

BMI

## [1] 21 19 26 22

data <- as.data.frame(cbind(data, BMI))

data

##      age sex height weight BMI
## 1   21  m   181     69  21
## 2   35  f   173     58  19
## 3 <NA> m   171     75  26
## 4 <NA> e   166     60  22
```