

Exercises for the course
“An introduction to R”

Exercise session Algorithmics in R: Tuesday - March 10, 2020

Exercise 1: *The role of the heartbeat in the relation between mother and infant*

We will study a dataset containing data about an experiment done with newborn babies. Newborns of different weight classes (variable `wghtcls`) are submitted to a treatment or are not submitted to a treatment (variable `treatment`). The treatment consists of hearing the sound of the heartbeats of the mother. The increase in weight (variable `wghtincr`) during a certain period of time is measured.

Download the file 'heartbeats.txt' from the course web page. Read the data from 'heartbeats.txt' into a data frame named `heartbeats`. Get an overview of the structure of the data frame. The group of newborns which had the heartbeat treatment is referred to as 'heartbeat group'.

Calculate:

- the mean of the increase in weight of all newborns
- the mean of the weight increase of the control group
- the mean of the weight increase in the heartbeat group
- the mean of the weight increase in each weight class of the control group
- the mean of the weight increase in each weight class of the heartbeat group
- the standard deviation of the weight increase of all newborns

Are the means in the heartbeat group higher than in the control group?

Exercise 2: *Exchanging A and B*

Write a R script that allows you to exchange the values of two variables A and B. At the end of the script, B must have the initial value of A and A must have the initial value of B. You can chose the starting values for A and B yourself.

Exercise 3: *Bird nests*

Remember the bird species we discussed on the first day of the course (exercise 6, sheet 1). In this species, females from 1 year and above build nests and males from 1 year and below 6 years also build a nest (to attract a female). Other individuals do not build a nest.

Write a R script that reads in the dataset `birdnests.txt`.

Add a column named `nest` to the dataset which says whether the bird will build a nest or not (factor TRUE or FALSE)

For each nest in the population the expected number of eggs should be :

- 1, 2 ,3, 4 or 5 with equal probability for nests built by a female
- 0 for male nest when no female is attracted (50% chance)
- 3, 4 or 5 with equal probability for male nest with female (the female has saved energy as she did not build the nest)

Following these rules, assign a number of eggs to each nest and then the total number of eggs produced by this bird population. Consider subsetting - for example, with the function `subset()` - the data and adding a new column.

Repeat this last step 100 times and compute the mean and standard deviation of the total number of eggs.

Hint: You might need the functions `sample()` and `rbinom()`. Look for help on these functions if needed.

Exercise 4: *The infinite loop*

Execute the following commands:

```
x <- 0
while (x < 1) {
  x <- 0
}
```

Hint: Use `Ctrl + C` to stop the execution or `STOP` in RStudio.

What happened?