

## SDA 2019 — Assignment 8

For these exercises you can use the *R*-functions `t.test`, `binom.test` and `wilcox.test`.

Make a concise report of *all* your answers in *one single PDF file*, with only *relevant R code in an appendix*. It is important to make clear in your answers how you have solved the questions. Graphs should look neat (label the axes, give titles, use correct dimensions etc.). Multiple graphs can be put into one figure using the command `par(mfrow=c(k,1))`, see `help(par)`. Sometimes there might be additional information on what exactly has to be handed in. **Read the file `AssignmentFormat.pdf` on Canvas carefully.**

**Exercise 8.1** This exercise is about the grades for one of the exams for the statistics course for the Business Analytics students. The data can be found in the file `statgrades.txt`. We assume that these data can be regarded as a random sample from the statistics grades population. Denote by  $m$  the unknown median of the grades population.

- Test at level  $\alpha = 5\%$  whether  $H_0 : m \geq 7.22$  versus  $H_1 : m < 7.22$ .
- Test at level  $\alpha = 10\%$  whether  $H_0 : m = 6.6$  versus  $H_1 : m \neq 6.6$ .
- Denote by  $p$  the probability to get a grade of at least 6.5.  
Test at level  $\alpha = 1\%$  whether  $H_0 : p \leq 40\%$  versus  $H_1 : p > 40\%$ .

**Hand in:** results of parts a, b, and c, including properly stated hypotheses.

**Exercise 8.2** This exercise concerns the clouds data, as in Assignment 7. Consider only the **unseeded** data for this exercise

- Which test do you prefer for testing the location of the precipitation values of the unseeded clouds: the  $t$ -test, the sign test or the signed rank test? Motivate your answer.
- Test whether the location of the precipitation value of the unseeded clouds is equal to 118.5 using the test your preferred in part a. Take the significance level  $\alpha = 0.1$ .
- Make 90% confidence intervals for the location of the precipitation value of unseeded clouds based on the sign test, the signed rank test, and the  $t$ -test.
- Which interval do you value most, and why?

**Hand in:** results of parts b and c, and your answers to parts a, b, and d.