**MOCK EXAM – Version A, Problem 1**

This is **not** part of the final assessment of learning outcome!

**Module**: **D2, Design and Analysis of Experiments**

Date of exam: 22 May 2020

Duration: 2 x 25 minutes

Type of exam: Open book, open internet, no communication with other human beings (i.e. printed material allowed, laptop allowed, wlan allowed, not allowed to communicate with other people)

Module coordinator: Lorenzo Tanadini (BFH)

Name of the student: *Please fill*

School: *Please fill*

Declaration: *Hereby I affirm that the examination is my own work and that I have not used other sources than explicitly allowed for the exam. Moreover, I have not supported other students in the online examination.*

**Exam Briefing**

* Write your name and affiliation on the first page
* Next to each problem, the number of points is indicated in parentheses, e.g. (3). Partial credit can be accredited for partially correct answers.
* The level of significance is 5% unless otherwise mentioned. Accordingly, confidence intervals should have a confidence level of 95%.
* Give numeric results (such as p values) to at least three digits.
* Always include a short reasoning (e.g. I applied a marginal F-test and obtained a p value of … , and therefore I conclude ….“)
* The exam consists of two exercises that will be handled sequentially
* The Final assessment counts towards 80% of the points for your grade.
* **Report all your answers on this document. Convert it as a PDF file before submission.**

Best of luck!

**Problem 1 (8 points)**

The tobacco data frame contains data on the total **height** (in cm, the sum of 20 tobacco plants per treatment and block) which had been exposed to seven different doses of radiation (**dose**, in roentgen). The seedlings were transplanted in a randomized complete block design with eight **block**s. It is the main aim to model the effect of the radiation on the height, while accounting for potential block effects.

Set your working directory appropriately and import the data set using:

mydata1 <- readRDS("tobacco\_data.rds")

(.rds is the safest format to move data sets across operating systems. Note that the same data is also provided in .csv and .xlsx format.)

1. Give the **R** code to produce suitable descriptive statistics to describe the data set. (1)
2. Give the **R** code to produce suitable graphical representations of the data set. What do you observe? (2)
3. Give the **R** code to fit a suitable parametric model to this data set. Perform an overall F-test, report its p-value and state your conclusion. (2)
4. Assess the model assumptions for your final model: explain what you assess, with which method, give your **R** code, discuss the results and state your conclusions. (3)