NMST434 – Modern statistical methods (2021–22)
Homework assignments

General instructions

- To obtain the course credit for the exercise class, you need at least 100 points out of 140 possible for the solutions of the homework assignments. At the same time, you must successfully solve the two indicated compulsory tasks (bootstrap and EM algorithm).

- Solutions have to be submitted via Moodle system. The names of the files should be in the form `yourfamilyname_hw1.pdf`. If R is used to calculate the results, please submit also R source file (and all the other files) that are needed to run your code.

- Hand written solutions are completely fine, but must be written in a **readable** way.

- The language of the homework reports can be either **English** or **Czech/Slovak**.

- If the number of your student card is needed for the assignment, include this number at the beginning of your solution of the assignment. If you do not have this number, use your date of birth in the format `YYYYMMDD`.

- In case of **plagiarism** all authors get zero points.

- If the homework includes analysis of (real or simulated) data, it is expected that you also **numerically calculate** the required estimators, confidence intervals, test statistics... Do not also forget to **specify the assumed model** and give **the formulas** so that it is clear how the result is calculated.

- Unless stated otherwise, it is acceptable that mathematical software (`Wolfram|Alpha`, `R`, `Mathematica` etc.) is used for the solution of partial problems (for instance, for computation of complicated integrals and sums). But, it must always be clear from the report how and why such a computation was performed, what was its input and output, and what is its relevance to the problem.

- If not stated otherwise use $5\,\%$ as the level (prescribed probability of type I error) of the tests and $95\,\%$ as the coverage of the confidence intervals.

Homework 1 (10 p) - deadline: 24. 2. 2023 at exerc. class (or 24. 2. 2023 at 23:59 in moodle)

We observe independent and identically distributed random variables $X_1, \ldots, X_n$ and we are interested in the coefficient of variation, i.e.

$$\theta = \frac{\sqrt{\operatorname{var} X_1}}{\operatorname{E} X_1}$$