Exercises for Computational Physics (physik760)
WS 2019/2020

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Exercises for the week from 20th to 24th of January 2020.

Reminder: The Bootstrap

Consider the data available at `https://ecampus.uni-bonn.de/goto_ecampus_fold_1637711.html` on eCampus. It represents the bootstrap samples (`corr_boot_sym.tsv`) and the original data (`orig_corr.tsv`) of a symmetrised pion correlation function at rest, which theoretically has the form

$$C(t) = \sum_{i=0}^{\infty} c_i \cdot \left(e^{-E_i t} + e^{-E_i (T-t)} \right) .$$

with $T = 48$ and $t \in \{0, 1, \ldots, T/2\}$. We can get rid off the back propagating part due to parity reasons of the pion by symmetrization. By that we can somehow double the statistics. The energies E_i are all distinct and larger than zero. Determine the ground state energy E_0 by fitting the appropriate theoretical form to the correlator data at large times.

The tsv-files can be red using `read.table("filename")`. They contain as many lines as bootstrap samples or original data and the number of columns ranges from 0 to $T/2$. From the red in matrices you can determine the covariance matrix directly. If you struggle to create data vectors of the i-th line from the red in data you can use `y <- as.vector(t(data_y[i,]))`.