

Exercises for Computational Physics (physik760)

WS 2019/2020

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Exercises for the week from 13th to 17th of January 2020.

Slice Sampler

1: Consider the density

$$f(x) = \frac{1}{2}e^{-\sqrt{x}}$$

for $x > 0$. Implement a slice sampler for simulating this density. Generate a histogram of a large number of variates and compare to the density $f(x)$.

How does the efficiency of the slice sampler change if \sqrt{x} is replaced with $x^{1/d}$, $d > 2$ with increasing d .

Gibbs Sampler

2: Ising Model:

During the last exercise you have implemented a Random-Walk Metropolis-Hastings algorithm for the Ising model at temperature T .

Implement in addition the algorithm discussed in example 7.6.1 and compare with Random-Walk Metropolis-Hastings algorithm in terms of acceptance rate and autocorrelation times at fixed temperature T .