1 Homework 6, due March 25, 2020

Write down a Monte-Carlo code for the 1d Ising model, preferably using Fortran. The partition function is given by

$$Z = \sum_{\{S_i\}} e^{K \sum_{i=1}^{N} S_i S_{i=1} + h \sum_{i=1}^{M} S_i}. \tag{1}$$

Use periodic boundary conditions, $S_{N+1} = S_1$. Update the spins using the Metropolis algorithm.

a) Make a graph of the history of the magnetization as a function of the number of sweeps (a sweep is a sequence of update where all lattice points have been updated once). Choose $K = H = 1$ and the magnetization

$$M = \frac{1}{N} \sum_{i=1}^{N} S_i. \tag{2}$$

b) For $K = 1$, calculate M as a function of h and compare with the theoretical expression. Make a graph.

Send me also a copy of your program, The input parameters are k, h, N and S (the number of sweeps). Output is magnetization.