

Exercise #05

due date: oral exam. Part c) is not compulsory and could be done in alternative to parts a) and b)

a) Prove the isomorphism between the Ising model in the Canonical Ensemble and the Lattice Gas model in the Grand-Canonical ensemble i.e. prove that $H_{LG} - \mu \langle N \rangle$ maps onto H_{Ising} up to some additive constants.

- Discuss the men-field phase transition found in the Ising model in the context of the lattice-gas.

b) After reading chapter II of [R.J. Baxter - Exactly solved models in statistical mechanics-Academic Press (1982)].

- Solve the Ising one-dimensional model with the transfer matrix method and prove that there is no phase transition at non zero temperature.
- Discuss the zero temperature limit.

c) Following the instruction here below

<http://www.aquila.infn.it/ciuchi/didattica/DOTT/OpenSystems/index.html>

try to compile and run the program Oscillators (a fortran compiler is needed).

Once compiled successfully try exercises #1 #2 #3.