

Homework 4

TIF150, Information theory for complex systems

Spin system

Consider a one-dimensional spin system where each site can be occupied by either A or B or C:

...	A	B	A	C	B	B	A	C	B	C	C	B	A	...
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Each spin interacts with the nearest neighbours. So each spin interacts with 2 other spins in total. For two interacting spins of the same type (A—A, B—B or C—C), that interaction contributes with an energy of $-J < 0$ to the total energy of the system; if the spins are different, the energy contribution is $+J > 0$.

If the density of spins A is a , what is the equilibrium distribution? Or, in other words, what are the probabilities over sequences of symbols that characterise the system?

You need not to solve the equations but you should set up the equations that determine the solution. You may keep the inverse temperature instead of energy. Describe and explain what the system looks like in the limit of zero temperature.

If you use equations or other results from the lectures or lecture notes, make sure to reference them and motivate why they may be used.