Assignment-4

Use the program 'ising.out' to carry out following calculations/observations. You do not need to edit source file to choose parameter values. Edit 'ising.in' file to set the parameter values. In this file 'lat' is the lattice size, temp is the reduced remperature T and 'nmc' is the total number of Monte Carlo cycles ('Monet Carlo time'). Set lat=10 and nmc = 20000 for all the runs. You only need to vary temperature T for the following exercises.

Q1. For the temperature values $T = 1.0, 1.5, 2.0, 2.1, 2.2, 2.3, 2.4, 2.5, 3.0, 3.5, 4.0$ plot energy Vs mcs and magnetization Vs mcs and observe nature of the curves, especially degree of fluctuations close to $T = 2.3$. DO NOT submit these plots.

Q2. For each of the temperatures mentioned above calculate the specific heat C and susceptibility χ (equations 15.19 and 15.20 in Gould/Tobochnik. Note $k = 1$ in reduced units we are using). Note: For calculations, you have to discard first 5000 data points in the output file 'ising.out' (for equilibration). Plot C Vs T and χ Vs T. From these plots estimate the value of phase transition temperature T_c and compare it with theoretical exact value. You have to submit these plots (and do not submit anything else).