PHYS4300 Numerical Methods and Scientific Computing

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Solution. *Problem 1.* Ising Model Monte Carlo Simulation: This code uses the Metropolis Monte Carlo method to calculate various thermal averages for the nearest neighbour Ising model in two dimensions. First we develop a code to develop a Markov chain of configurations of Ising spins that become distributed according to the Boltzman probability Distribution. Then we average the energy and magnetization over the MC steps for different temperatures and then plot the $T-$depedence of the energy E and magnetization M as kT increases from 1 to 3 in steps of 0.1, respectively. We then plot the temperature-dependence of the specific heat and the spin susceptibility, in the bottom two plots, respectively.

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