Assignment 6

Due Dec 19

1. Write a program that will implement the lattice Monte Carlo model we discussed in class.
   1. Start the program by generating a lattice with dimensions of 128 x 128
   2. Generate particles on lattice sites at random. Particles can either have a +ve or a –ve sign. Assume you have 60%+ve and 40%-ve particles.
   3. Use the following Hamiltonian for the particles , where Si and Sj can be +1 or -1 and J is the coupling constant.
   4. Perform the following monte carlo moves: particle exchange Use values of the exchange constant J/kT ranging from 0.1 – 0.8.
   5. Use periodic boundary conditions in your simulation
   6. Assume each Monte Carlo step consists of at least NxN attempted flips. Plot the Energy as a function of J. Make sure that for each value of J you system has reached equilibrium (you can check this by making sure that |E| remains constant (on average) as a function of the number of MC steps.
   7. Plot the final configuration of the system (after at least 10,000 MC steps) for each value of J and comment on the results
   8. Plot the averaged Specific Heat as a function of J.
   9. **Extra Credit:** Repeat steps c through h using the transport process (spin hopping). Assume you have 10% vacancies in your system.