

PHYS 352 – Assignment 6

Due: Fri., Mar 11, midnight

Submit code solutions and the .png's, .sh's, .plt's requested below. **Source files for your main executables** should be named “assignment7_X.c”, where “X” corresponds to the question numbers. Also submit the libIsingPhysics.a code and library that you've linked your executables against. Include your name enclosed in C comment tags (ie: `/*YourName*/`) at the top of each program. Create a zip archive containing all of your files, name it “assignment6_YourLastName.zip” (with the appropriate name replacement) and copy it to your `/projects/e20271/student/[netID]/homework` directory by midnight on Friday.

Critical Behavior with the Using Model (25 pt.)

In the follow problems you will investigate critical behavior the Ising model. Use a 100×100 lattice, except where noted. Keep the interaction strength J set to 1.

1. Plot $\langle M \rangle$ vs T for and compare with the results from the text and lecture.
2. Plot $\langle E \rangle / N$ vs T . Compare and discuss the results for the high and low temperature regimes.
3. Determine T_C from the specific heat per spin, C/N . Do this for lattice sizes of 20×20 , 50×50 , 100×100 and combine the results in a single plot. Comment on how the T_C values you obtain compare.
4. Plot the “reduced” correlation function, $f(i) - \langle s \rangle^2$, at $0.5 \times T_C$, $0.95 \times T_C$ and $2 \times T_C$. Determine the corresponding correlation lengths.
5. Produce several snapshots of the spin structure at $0.95 \times T_C$. Relate these observations to the correlation lengths you previously obtained.