Physics 2200 Midterm II Project

- Numerically estimate (with ∼ 5% relative error) the temperature of the phase transition of the two-dimensional ferromagnetic Ising model on a triangular lattice with nearest neighbor interactions:

$$E = -J \sum_{i,j} s_i s_j, \tag{1}$$

  where E is the total energy of the system, J is positive and denotes the strength of the ferromagnetic interaction and $s_i = \pm 1$ is the Ising spin variable. The geometry of the triangular lattice is shown in Fig. 1. Use the periodic boundary conditions for your finite size simulations. Measure the temperature in dimensionless units, i.e. use kT/J instead of T.
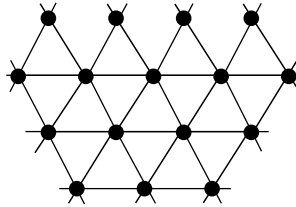

Figure 1: Triangular Ising lattice

- *Reproducible research* is a concept relevant for a data analysis or computational project. It requires that the data and the computer code which went into doing that analysis be available to others so that they might examine what you've done and reproduce your findings.

  In the spirit of reproducible research approach, your code must be 'compilable' (using make) and 'runnable' and produce the numerical results and graphics without any grader's intervention.

  As an exception from the general rule, you are allowed to 'extract' the temperature of the phase transition by the visual inspection of a graph (which must be automatically generated after/during your program run and available for the grader's inspection.)

- You are welcome to discuss the project's ideas with others in order to better understand them but the work you turn in must be your own. In particular, you must write your own code, run your own calculations, and communicate and explain the results in your own words.

- You are encouraged to talk to the instructor at all stages of your project.

Name: _____

Date: _____

Question:	1	2	3	Total
Points:	10	50	40	100
Score:				

Required project steps:

1. (10 points) Create a Github repository for your project, call it **m2**, and upload there all your C code, your Makefile, and .gitignore and .indent.pro files. Chose a license for your project.

   The URL of your repository: https://github.com/ _____

2. (50 points) Your C code should (a) produce the results, (b) use reliable components, (c) be well commented, (d) be written elegantly, and (e) properly and consistently formatted.

3. (40 points) Create README.md file that is written in markdown and describes (in great details) the design (45%), the implementation (45%), and the results (10%) of your project.