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Simulation of Ferromagnetic Properties for the Two-Dimensional Ising Model CHRISTOPHER LEMON, RONALD JOHNS, Ohio Northern University — A Matlab program was written that uses Monte Carlo methods and the heat bath algorithm to simulate the two-dimensional Ising model. Several program variations were written to see if the simulation would accurately predict the existence of the Curie temperature and ferromagnetic domains. For a variety of square lattices, the net magnetization was calculated as the applied magnetic field was varied. It was found that the simulated Curie temperature is in good agreement with that predicted from the theory of the Ising model. Additionally, simulations show that lattice sites of the same spin tend to cluster together; the size of these domains is dependent on the external magnetic field. Based on these results, this program successfully simulates two hallmarks of the Ising model of ferromagnetism: Curie temperature and ferromagnetic domains.

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