Phase transitions in the Ising Model

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- Explain the meanings of the terms first order phase transition and continuous phase transition

- Explain how statistical mechanics shows that finite sized systems do not exhibit phase transitions

- Explain the meaning of the term thermodynamic limit

- Explain why the free energy of the Ising model is given by $F = -k_B T \ln \lambda_1$ in the thermodynamic limit. In this expression λ_1 is the principle eigenvalue of the transfer matrix

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- Derive an expression for the average magnetisation of the Ising model in the thermodynamic limit

- Explain how the magnetic suceptibility is calculated and derive an expression for this quantity for the Ising model in the thermodynamic limit.

- Discuss the behavior of the suceptibility of the Ising model as the temperature goes to zero and whether or not this behavior is indivative of a phase transition.