

1: Discuss the physical meaning of J , in particular the sign of J , and the role it plays in magnets, for example.

Answer: J is the interaction parameter, which shows the strength scale for how the neighboring spins interact with each other, A Positive value of J show a Ferromagnetic behavior of the system, while negative value show anti-Ferromagnetic behavior. The interaction parameter can be random for each pair, in that case we have to form of spin glass.

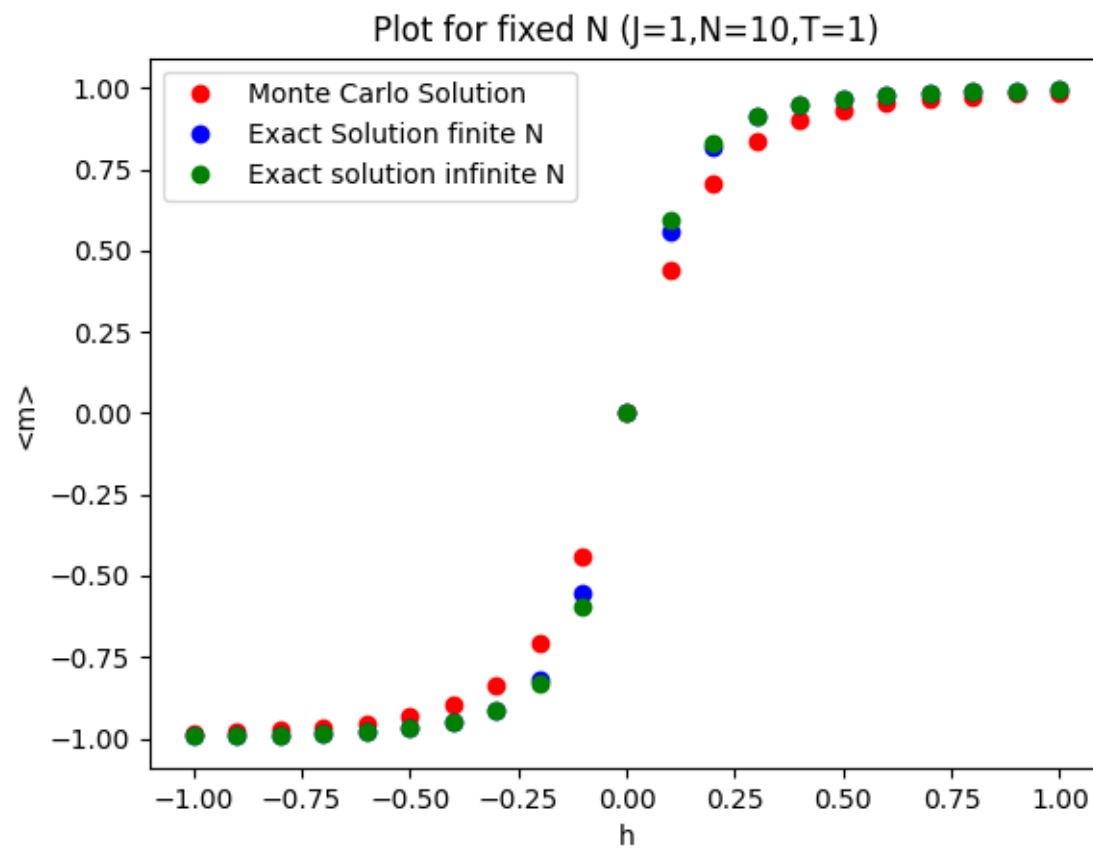
2: Clarify what it means to have periodic boundary conditions (nearest neighbors).

Answers: boundary condition shows behavior of a system at the boundaries , to solve a system with infinite size, in our case it says that $S_{N+1} = S_1$. To simply put it says that we simply assume a ring of spins instead of a chain.

3: Since we work with units where $k_B = 1$, what are the relevant dimensionless ratios in this problem?

Answer: h/T and J/T are the dimensionless ratios because we can't have quantities with dimensions in Analytic Function like Exponential function and trigonometric function.

Result for Fixed value of N and Varying value of h



Result for fixed value of h and varying N

