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# Monte Carlo Simulation

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- Explain why it is not possible to calculate the partition function exactly for many complex systems of interest?
- Give a formula that allows one to calculate the value of an ensemble average
- How is the ensemble average related to the expectation of a random variable
- State the law of large numbers and define all the symbols in this expression



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- Explain how and why we can calculate ensemble averages approximately by generating multiple random variables
- Explain the Markov property
- Explain the ergodic property that some Markov chains possess
- Explain in your own words why we can estimate an ensemble average by sampling from a Markov chain

# Monte Carlo Simulation

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- Explain the metropolis sampling algorithm