The free energy landscape for the mean field 1D ising model

MathsNET
A joined up approach to teaching and learning mathematics

- What is significant about the points where the black curve intercepts with the x axis?

- When the applied field H is equal to 0 at how many points does the black line intercept with the x axis? What happens as the the inverse temperature is increased?

- Describe the shape of the green curve when $H = 0$ and when (a) $T < 0.5$ and when (b) $T > 0.5$. How does the shape of this curve differ in these two regimes? What happens to the derivative of the free energy with respect to $\langle M \rangle$ at $H = 0$ when $T = 0.5$?

- What happens to the shape of the green curve when $H \neq 0$. Comment on the behavior of the turning points and the way this number changes with field strength and temperature.

The free energy landscape for the mean field 1D ising model

MathsNET
A joined up approach to teaching and learning mathematics

- Given what you have discussed explain how the magnetization behaves as you move from the $T > 0.5$ regime to the $T < 0.5$ regime in the absense of an applied field

- How does the magnetisation behave as the temperature is increased in the presence of an applied magentic field?