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

- 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) $T < 2\frac{k_B T}{J}$ and when (b) $T > 2\frac{k_B T}{J}$. 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 $T = 2\frac{k_B T}{J}$?

- 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

- Given what you have discussed explain how the magnetization behaves as you move from the $T > 2\frac{k_B T}{J}$ regime to the $T < 2\frac{k_B T}{J}$ 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?