

Results of Exercise 4.2:

$$U = -N\varepsilon \tanh\left(\frac{\varepsilon}{k_B T}\right)$$

$$M = \mu_B N \tanh\left(\frac{\varepsilon}{k_B T}\right)$$

$$S = -Nk_B \left[ \frac{1-x}{2} \log\left(\frac{1-x}{2}\right) + \frac{1+x}{2} \log\left(\frac{1+x}{2}\right) \right],$$

$$\text{with } x = \frac{U}{N\varepsilon}.$$