

# Problems

- Which of the phase diagrams in the introduction are wrong? Why?
- Convince yourself the the m-t has diagram for the Ising model is correct

• Calculate the magnetic susceptibility in Ising model,  $\chi = \frac{dm}{dh}$

• Show that  $\chi_2 \sim \left. \frac{d\rho}{d\mu} \right|_T = \frac{\rho}{\left. dP/d\rho \right|_T}$ . What does this imply?

• Work out the first 2 or 3 (factorial) cumulants in terms of (factorial) moments. Do the same thing by using the generating functions

• Work out the factorial cumulant generating function for a Poisson and Binomial distribution and convince yourself that the factorial cumulants for Poisson vanish for  $n > 1$ .

• Work out factorial cumulant (Moment) generating function for  $P(n) = \sum_N P_{\text{binomial}}(n; N)P(N)$

with  $P(N)$  an arbitrary distribution function.

# Bonus problem

Show that the equation on the right is correct;  
Explain your work!

