Session 6 :

Exercise 1

Let's say that, for a given system, the free energy close to the critical point is of the form

$$f(m) = \frac{1}{2} a t m^2 + \frac{1}{6!} b m^6 + \frac{1}{2} c (\vec{\nabla} m)^2 \qquad b>0 \quad c>0$$

$$t = \frac{T - T_c}{T}$$

1) How does m scale with $|t|$ close to T_c ?

2) What is the upper critical dimension of the model ?
(still use the correlation function for the gaussian model)

Exercise 2

How does the solution of the diffusion equation changes upon rescaling of the length ? How does time must scale so that everything looks the same ?

Remember :

$$\frac{\partial P}{\partial t} = D \nabla^2 P \qquad P(\vec{x}, 0) = \delta(\vec{x})$$