Department of Physics
Shahid Beheshti University

CRITICAL PHENOMENA

Exercise Set 6

(Due Date: 1401/09/20)

1. Exercises no. 3.1, 3.3, 5.2, 5.3, 6.4, 7.1 Goldenfeld.

2. Incorporating Gaussian approximation in the Landau theory in d-Dimension for n-fields according to:

$$L[\phi] = \int d^d r \left[a_0 + a_2(t)\phi^2 + a_4\phi^4 + (\nabla\phi)^2 \right]$$

determmie all of scaling exponents and derive the C_V for $T > T_c$ and $T < T_c$. Also, show that in the Fourier space, the partition function is given by:

$$Z = \int \mathcal{D}[\phi] e^{-\frac{1}{2} \int d^d k (\xi^{-2} + k^2)\psi(-k)\psi(k)}$$

here $\xi^{-2} \equiv a_2(t)$ for $T > T_c$, $\xi^{-2} \equiv -2a_2(t)$ for $T < T_c$ and $\phi(r) = \phi_0 + \psi(r)$

3. Exercises no. 2.2, 2.3, Kardar

Good luck, Movahed