

In the name of God

Department of Physics  
Shahid Beheshti University

ADVANCED METHODS ON COMPUTATIONAL PHYSICS

Exercise Set 13

(Date Due: 1399/03/25)

1. Write a MCMC program to compute  $\langle E \rangle$ ,  $\langle |M| \rangle$ ,  $C_V$  and  $\chi$  as a function of temperature for a 2d Ising model with

$$\mathcal{H} = -J \sum_{\langle ij \rangle} S_i S_j$$

suppose you have 400 atoms and  $k_B = J = 1$  and for  $T \in [1 - 4]$  with  $\Delta T = 0.1$ .

2. For above , consider an external magnetic field as  $B_{ext} = +1$ , now compute  $\langle E \rangle$ ,  $\langle |M| \rangle$ ,  $C_V$  and  $\chi$  as a function of temperature,

Good luck, Movahed

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