

In the name of God

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CRITICAL PHENOMENA

Exercise Set 4

(Due Date: 1401/08/30)

1. Exercises no. 1, 2, 3, 7 of chapter 2, Cardy.
2. According to Saddle point approximation, show that Mean-Field theory would be exact for $d \rightarrow \infty$.
3. According to entropy as $S = -K_B \sum_s P(s) \ln P(s)$, where $P(s)$ is the probability of finding a spin whose value is s and by using $F = E - TS$, compute the $\langle s \rangle$. (Hint: suppose that $s = \pm 1$ and $P(s = +1) + P(s = -1) = 1$ and $\langle s \rangle = \sum_s sP(s)$, $E = \langle \mathcal{H} \rangle_{mean-field}$, where $\mathcal{H} = -J \sum s_i s_j - H \sum s_i$)

Good luck, Movahed
