

Physics 219 - Problem Set 5 (Optional)

Due Date: Thursday, March 12

1. For a hard sphere gas,

$$V(r) = \begin{cases} \infty & \text{if } r \leq a \\ 0 & \text{if } r > a \end{cases} \quad (1)$$

compute the third virial coefficient, $a_3(T)$.

2. Using the definition of the magnetic susceptibility, $\chi = -\frac{d^2F}{dh^2}$, show that in the 1D Ising model

$$\chi = \frac{1}{T} \sum_{i,j} (\langle \sigma_i \sigma_j \rangle - \langle \sigma_i \rangle \langle \sigma_j \rangle)$$