

Physics 831 - 2002

Statistical Physics

Problem Set 5

1. Use the steepest descent method to calculate the Gamma function $\Gamma(z + 1/2)$ for large z (5 pt)
2. Problem 6.4 for identical gases (3 pt)
3. For a classical system of **interacting** non-relativistic atoms of mass m at temperature T , find the probability density for an atom to have a kinetic energy ε . Find the average kinetic energy and the root mean square fluctuation of the kinetic energy (6 pt)
4. Problem 7.4 (6 pt)
5. Problem 7.6 [the problem is about atoms, not molecules] (6 pt)
6. Problem 7.5 (6 pt)

The problems are from Kerson Huang, *Statistical Mechanics*, 2nd edition, (Wiley, NY 1987).