Physics A410: Thermal Physics

Problem Set 4

Assigned 2004 February 3
Due 2004 February 10

Show your work on all problems! Be sure to give credit to any collaborators, or outside sources used in solving the problems.

1 Schroeder 2.7

In addition, verify that the number of microstates you got is what you expect from equation (2.9).

2 Interacting Systems

Consider a system of two Einstein solids, A and B, each containing 12 oscillators, sharing a total of 24 units of energy. Assume that the solids are weakly coupled, and that the total energy is fixed.

(a) How many different *macro*states are available to the system?

(b) How many different *micro*states are available to the system?

(c) Assuming that this system is in thermal equilibrium, what is the probability of finding all the energy in solid A?

(d) What is the probability of finding exactly half the energy in solid A?

(e) Under what circumstances would this system exhibit irreversible behavior?

3 Schroeder 2.12

4 Schroeder 2.19