PHY 540 **Statistical Mechanics** Spring 2007

Optional Homework Problems
(Completely voluntary, no grading)

Problem O.1. Find thermodynamic properties (including entropy, all relevant thermodynamic potentials and specific heat), as well as the energy level occupancies $\langle n_k \rangle$, for a system of N similar, non-interacting, distinguishable*) quantum oscillators, in thermal equilibrium at temperature T. For each variable, sketch its temperature dependence, find asymptotic values (or trends) in the low-temperature and high-temperature limits, and give physical interpretations of the temperature behavior.

*) Say, fixed at different spatial locations.

Problem O.2. Find statistical and thermodynamic properties of an ideal classical gas of 2D particles.

Hint: Redefine thermodynamic variables by replacing volume V for the gas area.