Physics 219
Homework 7

Do problems: Reif 9.4, 9.7, 9.22, 9.23, 9.27
and Sethna 8.3, 8.5, 8.6, 8.7(b) (optional), 8.13 (optional)

and:

A one dimensional system consists of a point mass m attached to a linear spring with spring coefficient k. The other end of the spring is tethered to a wall which is completely impenetrable. Thus the equilibrium position of the spring is at the wall.

(a) First consider the system to be classical and calculate the average energy as a function of temperature.

(b) Now consider the system to be quantum mechanical and calculate the average energy as a function of temperature.

(c) Show that your answer in part (b) goes to your answer in part (a) in the limit of high temperature. Evaluate your answer in part (b) at zero temperature.