DUE: THURSDAY MARCH 9, 2000

All problems are taken from Baierlein unless otherwise indicated. *In order to earn total credit for a problem solution, you must show all work involved in obtaining the solution.* Late homework received before Tuesday March 14 will be graded at half credit. No homework sets accepted after solution sets are handed out.

1. Chapter 12, problem 5 (p. 303)

2. Chapter 12, problem 8 (p. 303)

3. Chapter 12, problem 12 (p. 304).

4. Chapter 12, problem 13 (p. 304).

5. A monatomic gas consisting of N atoms at temperature T_1 occupies a volume V_1. Suddenly, the gas expands freely into a vacuum. Assume that the system is thermally isolated (*i.e.*, the expansion is adiabatic). When thermal equilibrium is reached, the gas occupies a volume $V_2 > V_1$ and is found to be at temperature T_2.

(a) If the gas is a classical ideal gas, is T_2 less than, equal to, or greater than T_1? Explain.

(b) If the gas satisfies the van der Waals equation of state, compute T_2 in terms of T_1, N, V_1, V_2 and the van der Waals coefficients a and b. In this case, is T_2 less than, equal to, or greater than T_1?

6. Chapter 9, problem 1 (p. 215).

7. Chapter 9, problem 7 (p. 216).