DUE: THURSDAY MARCH 16, 2000

FINAL EXAM ALERT: The final exam will be given on Friday March 17, 2000 from 7:30–10:30 pm in 283 Kerr Hall. This will be a open book exam. However, during the exam you may only consult Baierlein's textbook and any two sheets of handwritten material of your choice. The exam will cover material from the entire course (taken from chapters 1–14 of Baierlein and all homework sets).

All problems are taken from Baierlein unless otherwise indicated. This problem set is optional (although you are responsible for the material covered here). You may hand in these problems for grading before solutions are made available. Graded homework will earn bonus points and may help with your standing in the class. Solutions will be available at 5 pm on Thursday March 16.

1. Chapter 9, problem 4 (p. 215)

2. Chapter 9, problem 5 (p. 216)

3. Chapter 9, problem 15 (p. 218)

4. Chapter 9, problem 16 (p. 218).

5. (a) Show that a Fermi electron gas in the ground state exerts a pressure

$$P = \frac{\hbar^2(3\pi^2)^{2/3}}{5m}\left(\frac{N}{V}\right)^{5/3} .$$

(b) Find an expression for the entropy of a Fermi electron gas in the region where $T \ll T_F$.

6. Chapter 9, problem 20 (p. 219–220).

7. Chapter 14, problem 3 (p. 354).