

Assignment #6      PY 541      Week of Oct. 10–13, 2006

**Reading:** We will be continuing with the discussion of ideal Fermi gases and their applications, including Landau diamagnetism, thermionic emission, the photoelectric effect, and white dwarf stars. Please finish reading chapter 8 of the text. For additional information on the statistical mechanics of ideal Fermi gases, please consult chapter 11 of Huang.

**Note:** I am currently thinking of Tuesday October 19 as the date for the midterm. Please let me know if this is not appropriate. The test will be closed book, with no notes or calculators allowed or required. Considerable algebra should also not be needed; keep this in mind if you get involved in a calculation which appears to be formidable.

**Problems:** Due Friday October 20.

1. This problem contains two complementary pieces that involve calculating the mean speed of a Fermi gas.
  - (a) (From Reif 9.16) Consider an ideal Fermi gas of identical particles of mass  $m$  at  $T = 0$ . The Fermi energy equals  $\mu$ . Find  $\langle v_x^2 \rangle$ .
  - (b) Pathria 8.7.
2. Pathria 8.14.
3. Pathria 8.19. Note: You may find it helpful to use the result for  $C_V$  that is quoted in problem 8.13.