Physics 404   HOMEWORK ASSIGNMENT #10   **Spring 2012**

Due date: Tuesday, Nov. 20   **Deadline:** Tuesday, Nov. 27

S means a problem in Schroeder's text. The number in parentheses is the number of points.

1. (10) S 7.22 Relativistic electrons: $\varepsilon \propto |\mathbf{p}|$

2. (10) S 7.23 b,c,f White dwarf star. Assume, from part a) that $U_{grav} = - (3/5)GM^2/R$.

   The answers to d and e are: $R \approx 7\times10^6$ m, $\rho \approx 1\times10^9$ kg/m^3, $\varepsilon_F \approx 2\times10^5$ eV, $T_F \approx 2\times10^9$ K

3. (10) S 7.26 Liquid ^{3}He as a degenerate Fermi gas.

4. (10) S 7.28 a,b,c,e D=2 Fermi gas. The answer for part d is $\mu = \ln [\exp(\varepsilon_F/k_BT) - 1]$

5. (15) S 7.33a,b 7.34 a-d Semiconductors: gaps, chemical potential, holes, etc.

   In 7.33 b and in 7.34 b,c, use $\int_0^\infty \sqrt{x}\, e^{-x}dx = \sqrt{\pi}\,/\,2$