PHY 292S **Problem Set #4** **Winter 2008**

Due on Thursday, April 11th before the lecture.

1. Problem 7.39 on p. 293 of Schroeder

2. Problem 7.48 on p. 297 of Schroeder. Skip the part (a), and use the fact that μ=0. *Hint: Note that for the neutrino gas, Fermi-Dirac distribution function (7.23) should be used, (of course with μ=0) instead of (7.73). The remaining calculations are the same as photon gas, except for the factors accounting for neutrino species and antineutrinos. For part (d), you can assume that the density of ordinary matter is about one proton per cubic meter. You may need the following formula:* $\int_0^\infty \frac{x^3 dx}{e^x+1} = \frac{7\pi^4}{120}$; $\int_0^\infty \frac{x^2 dx}{e^x+1} \cong 1.804$

3. In this exercise, you are asked to plot the Planck's distribution function for two well known radiation sources: the sun and the incandescent lamp. Problem 7.43 (b) on p. 295 is for the sun, and 7.51 (c) on p. 303 is for the tungsten incandescent lamp. You should plot them on one graph. Clearly note the energy range corresponding to the visible light. Note that the spectrum is given by Eq. 7.84.