Homework #8
Due Friday Dec 5

Homework is due by 5:00 pm on the due date. Late homework will not be accepted.

1. For a zero temerature Fermi gas:
   (a) Show that $n = \frac{4\pi g}{(2\pi\hbar)^3}\frac{p_f^3}{3}$
   (b) Find p_F in terms of n.
   (c) What is the Fermi energy ϵ_F in the non relativistic (NR) case?
   (d) What is the Fermi energy ϵ_F in the extremely relativistic (ER) case?
   (e) Given that the Pressure is:

$$P = \frac{2g}{(2\pi\hbar)^3}\int_0^{2\pi} d\phi \int_0^{\pi/2} \cos^2\theta \sin\theta \, d\theta \int_0^{p_F} v_p p^3 \, dp$$

   find the pressure in the NR and ER cases in terms of the number density n.
   (f) Find the energy density U in terms of the number density n in the NR and ER cases.
   (g) Show that $P = (\gamma - 1)U$ in both the NR and ER cases

2. LeBlanc 6.2

3. LeBlanc 6.7

4. LeBlanc 6.15