Astronomy 304, STARS

Homework # 5, Due Wednesday, Feb. 12, 2003

Show All Your Work

1. Calculate the pressure exerted by a gas of degenerate neutrons in terms of the mass density. Express the answer in g cm^{-3}. What density would be needed to make this pressure of the same order of magnitude as our estimate for the central pressure of the Sun? How does this compare with the current central density of the Sun of about 160 g cm^{-3}?

2. Derive the formula for the pressure of a gas of degenerate extremely relativistic particles (you need not get the constants exactly correct),

$$P = \frac{1}{8}\left(\frac{3}{\pi}\right)^{1/3} hcn^{4/3}$$

3. Carroll & Ostlie: problem 10.9

4. Carroll & Ostlie: problem 10.12 (a) and (b)

5. Carroll & Ostlie: problem 10.15

6. Carroll & Ostlie: problem 10.16