Astronomy 401

Stars

Homework # 4, Due Thursday, October 11, 2001

Name: ______________________________

Student number: ________________________

1. Derive the average velocity for a particle of mass m and temperature T.

2. Derive the formula for the pressure of a gas of 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. Derive the expression for the thermal conductivity of non-degenerate electrons,

$$K = \frac{3^{1/2}}{2\pi}\frac{k^{7/2}T^{5/2}}{m^{1/2}e^4}$$

4. Carroll & Ostlie: problem 3.2

   (The *solar constant* is the flux of energy from the Sun incident on the Earth outside the Earth's atmosphere, p 67.)

5. (a) What is the dominant source of opacity near the surface of the Sun? (b) Why is this not the main source of opacity near the center of the Sun?

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6. Below is an image of the Sun in the ultraviolet. What can you deduce about the Sun from this image?