Physics 214A
Problem Set 3
Fall 1997

Problem 8.

For some system, with positve energy, the entropy is

$$S(E) = \quad a\left[\ln\left(\frac{E}{E_o}\right) + \frac{E}{E_o}\right] \; ; \quad a > 0, \quad E_o > 0.$$

1. Is there a limiting temperature?
2. Can you get to this temperature? (Hint: Look at the specific heat.)

Problem 9. Pathria 3.7

Problem 10.

The relativistic energy of a particle of mass m is

$$E = \sqrt{p^2c^2 + m^2c^4} \; ;$$

c is the velocity of light. N such particles are in equilibrium at temperature T. Find

$$\langle \frac{p_x^2}{E} \rangle .$$

p_x is x component of one of the particle's momenta and E its energy.

Problem 11. Pathria 3.15 (except for the last sentence).