

Physics 410 - 2004

Thermal Physics

Problem Set 11

1. Chapter 7, p. 218, problem 1 (3 pt)
2. Chapter 7, p. 218, problem 2 (3 pt)
3. Chapter 7, p. 219, problem 5 (4 pt)
4. Chapter 7, p. 222, problem 9 (5 pt)
5. Chapter 7, p. 222, problem 12 (3 pt)
6. Calculate the Ω -potential for a degenerate Fermi gas of particles with mass m and spin $1/2$ in the limit $\tau \rightarrow 0$. Use it to find pressure of the gas as function of density n (6 pt)
7. For low temperatures, find the heat capacity of an ultra-relativistic Fermi gas of N particles with spin $1/2$ and energy $\varepsilon = pc$ (6 pt)

You need to have 25 points out of 30 (5 points are extra credit).

The problems are from Kittel & Kroemer, *Thermal Physics*, 2nd edition, (Freeman, NY 1980).