

## Homework 5, due 10/19/04

11. Show that the sum of the energy densities of neutrinos and antineutrinos in thermal equilibrium is given by

$$\rho(\nu_e) + \rho(\bar{\nu}_e) = \frac{aT^4}{c^2} \left[ \frac{7}{8} + \frac{15}{4\pi^2} \left( \frac{\mu}{kT} \right)^2 + \frac{15}{8\pi^4} \left( \frac{\mu}{kT} \right)^4 \right]$$