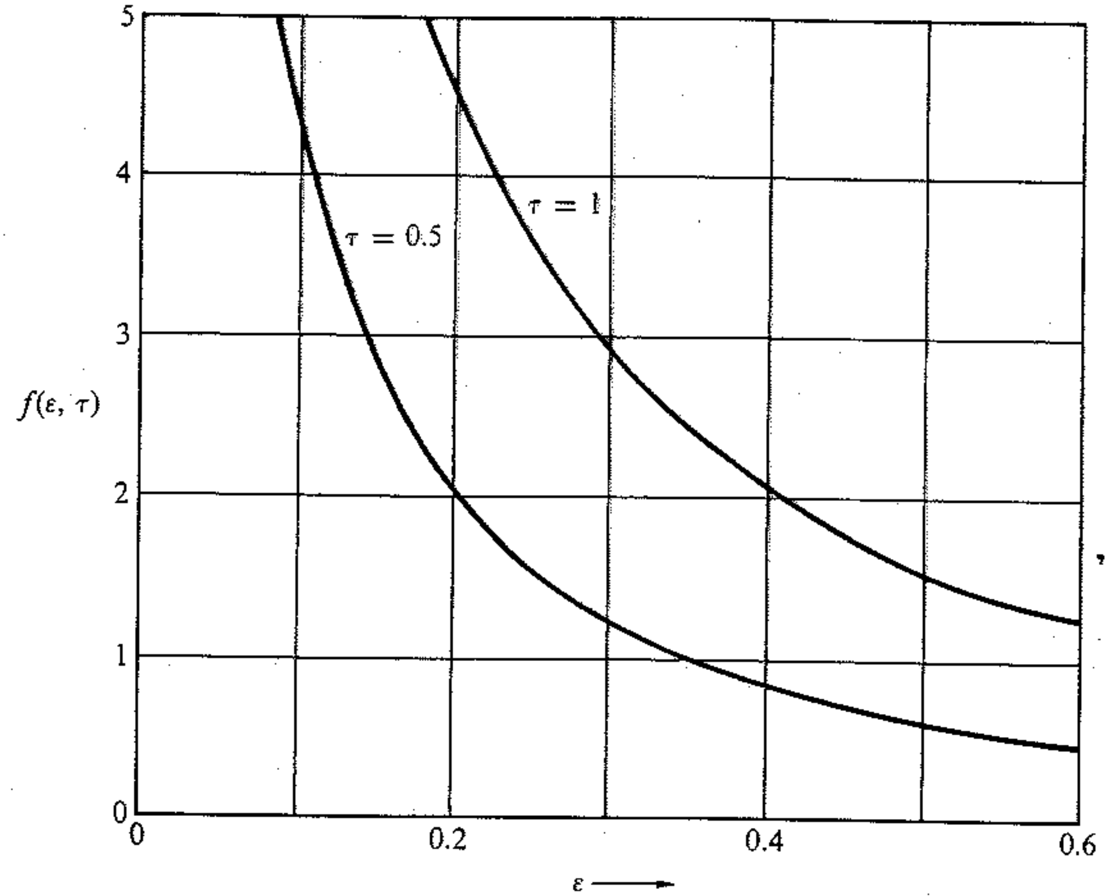

Figure 7.10 Plot of the boson distribution function for two temperatures, with sufficient particles present to ensure $\lambda \simeq 1$. The integral of the distribution times the density of states gives the number N_e of particles in excited orbitals; the rest of the particles present are condensed into the ground state orbital. The value of N_0 is too large to be shown on the plot.

$f(\varepsilon,\tau)$ as the Bose-Einstein distribution function. The integral gives only the number of atoms in excited orbitals and excludes the atoms in the ground orbital, because the function $\mathfrak{D}(\varepsilon)$ is zero at $\varepsilon = 0$. To count the atoms correctly we must count separately the occupancy N_0 of the orbital with $\varepsilon = 0$. Although only a single orbital is involved, the value of N_0 may be very large in a gas of bosons. We shall call N_0 the number of atoms in the **condensed phase** and N_e the number of atoms in the **normal phase**. The whole secret of the result which follows is that at low temperatures the chemical potential μ is very much closer in energy to the ground state orbital than the first excited orbital is to the ground state orbital. This closeness of μ to the ground orbital loads most of the population of the system into the ground orbital (Figure 7.10).