Fermi Dirac distribution law

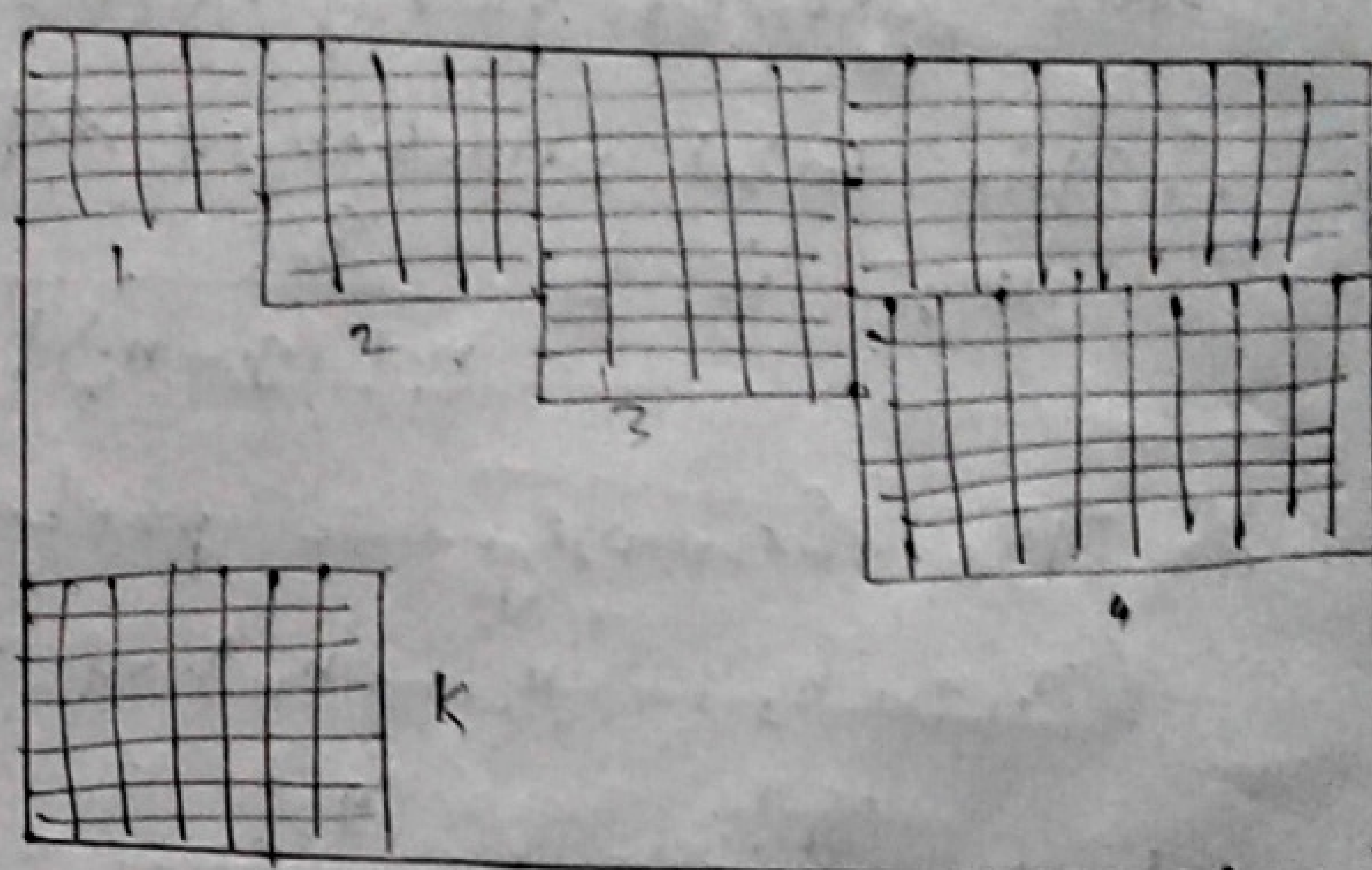
Basic postulates:

① The particles are indistinguishable.

② The particles obey pauli's exclusion principle. Therefore, the number of cells must be much greater than the number of particles i.e. $g_i >> n_i$.

Consider a system consisting of 'n' independent and indistinguishable particles. Let us divide the available volume in the phase space into large number (say K) of compartments (quantum groups or energy levels), each compartment is further divided into elementary cells, each of size h^3, where h is a planck's constant.

Let the compartments be marked 1, 2, 3, 4, --- K and their mean energy values be represented by $E_1, E_2, E_3 --- E_i, --- E_K$ containing $g_1, g_2, g_3 ---$ $g_i, -- g_K$ cells respectively in them.



The total number of particles in the system is

$$n = n_1 + n_2 + n_3 + --- + n_i + \cdots + n_K \quad \text{--- (1)}$$

where $n_1 \rightarrow$ no. of particles in compartment 1

$n_2 \rightarrow$ " " " " 2

$\vdots$

$n_i \rightarrow$ " " " " i

$\vdots$

$n_K \rightarrow$ " " " " K

Our work is to find the distribution of n_i particles (fermions) out of the total 'n' particles in g_i cells of the ith compartment.