CLASS WORK to be evaluated on Jan 18/20, 2022

1. METHOD
   (a) Write the Distribution Functions for Maxwell-Boltzmann, Fermi-Dirac and Bose-Einstein.
   (b) Explain Fermi energy and chemical potential and their importance/significance.
2. CODING
   (a) **(Plot : Figure 1)**
   *Plot the three distribution functions (Maxwell-Boltzmann, Fermi-Dirac and Bose-Einstein) as a function of energy ($\epsilon/kT$) taking the same value of $\alpha = 0$ or 1.*

   Hint! the BE graph **should be** drawn for $(\epsilon/kT) > -\alpha$ [i.e., $(\epsilon/kT) > -(-\mu/kT)$ or $\epsilon > \mu$ as $f_{BE}$ cannot be negative; observe a spike at $\alpha$.

   (b) **(Plot : Figure 2)**
   *Plot the Fermi-Dirac distribution function as a function of energy for $\epsilon_F = 1\ eV$ for $\epsilon$ range $[-4, 4]$ at different temperatures $T = 10\ K, 100\ K, 1000\ K, 5000\ K$.*

   (c) **(Plot : Figure 3)**
   Take a hypothetical case of $\mu = 1\ eV$. From figure 1 above we learnt that for BE case the minimum energy $\epsilon_{min} > \mu$ and thus for all energies we have $\epsilon > \mu$.
   *Plot the Bose-Einstein distribution function as a function of energy for $\mu = 1$ for $\epsilon$ range $(\mu, 4]$ at different temperatures $T = 10\ K, 100\ K, 1000\ K, 5000\ K$.*