Phys2021

#6. Derive the average energy $E_{avg}=kT$ for a classical oscillator from their classical energy distribution: According to the Boltzmann distribution, the probability for an oscillator to have energy E is $P(E) = A_0 \exp(-E/kT)$, where k is the Boltzmann constant and A_0 is some number (the normalization constant). That is, if you have a very large number of oscillators and want to know how many of them have energies in some small interval between E and $E+dE$, that number is $N(E) = P(E)dE = A_0 \exp(-E/kT)dE$. Your task is to calculate the average energy per oscillator.
Hint: The average energy is the total energy of the system divided by the number of oscillators.