

1. Calculate the number of electrons in the conduction band for silicon at  $T = 300$  K. (Assume  $m_e^* / m_0 = 1$ .)
2. Calculate the Fermi energy of an intrinsic semiconductor at  $T \neq 0$  K. (*Hint* : Give a mathematical expression for the fact that the probability of finding an electron at the top of the valence band plus the probability of finding an electron at the bottom of the conduction band must be 1.) Let  $N_e = N_p$  and  $m_e^* = m_h^*$ .