

**Solid state physics 2018 Problem Set #10. Due May 28**

1. Kittel, Chap. 8 Prob. 3
2. Indicate on an energy level diagram the conduction and valence bands, donor and acceptor states. What are the positions of Fermi levels for
  - a. An intrinsic semiconductor?
  - b. An n-type semiconductor?
  - c. A p-type semiconductor?
3. For an intrinsic semiconductor with gap  $E_g=0.7$  eV, determine the position of Fermi level at  $T=300\text{K}$  if  $m_h=6m_e$ . Also calculate the density of holes and electrons at 300K. How do these quantities alter if  $E_g=7$  eV?
4. Calculate the resistivity at 300K for pure germanium from the following data:  
 $E_g=0.72$  eV,  $\mu_n=0.39\text{m}^2\text{V}^{-1}\text{s}^{-1}$ ,  $\mu_h=0.19\text{m}^2\text{V}^{-1}\text{s}^{-1}$
5. Kittel, Chap. 9 Prob. 2