1. What is meant by a substitutional impurity in a crystal?
2. What is meant by an interstitial impurity?
3. What is the difference between crystalline material and polycrystalline material?
4. Describe a hole in a semiconductor.
5. What is meant by an indirect and direct band gap semiconductor and give examples of each?
6. What is the meaning of the Fermi Dirac probability function?
7. What is the Fermi energy?
8. The lattice constant of GaAs is 5.65 angstroms, determine the number of Ga atoms and As atoms per cm^3 , what is the unit cell of GaAs, calculate the density of GaAs from this data.
9. (2pts) Determine the total number (#/cm^3) of energy states in silicon between Ec and Ec+4kT at T=200K, T=300K and T=500 K.
10. (3pts)Determine the probability that an energy level is occupied by an electron if the state is above the Fermi level by

a) .5kT

b) 6kT

c) 8kT

1. (4pts) The Fermi energy for copper at T=300 K is 7.0 eV. The electrons in copper follow the Fermi Dirac distribution function.
2. Find the probability of an energy level at 7.15 eV being occupied by an electron
3. Repeat part a for T=1000 K (assume Ef is constant
4. Repeat part a for E=6.85 eV and T=300 K
5. Determine the probability of the energy sate at E=Ef being occupied at T=300 K and at T=1000 K