Physics 3313, Homework #1 (due 2/2)

P1 In a simple cubic lattice, what is the angle between the following planes: (a) (100) and (110); (b) (100) and (210)?

P2 In a body-centered cubic lattice with the lattice constant 2 Å, calculate the surface density of atoms on the (a) (110) plane, (b) (111) plane.

P3 If the distance between the atoms in the diamond lattice is 0.9 Å, what is the lattice constant?

P4 If $2.5 \times 10^{14}$ boron atoms per cm$^3$ are added to silicon as a substitutional impurity, determine what fraction of the silicon atoms are displaced in the lattice. The lattice constant of Si is 5.43 Å.

P5 In the previous problem, estimate the average distance between the nearest impurity atoms. (Assume the boron atoms form a simple cubic lattice.)