Hints for HW1

1.2 For BCC crystal, the largest atoms possible are across the diagonal of the cube:
it forms a triangle with a, $a\sqrt{2}$, x. you need to find x and divide by 2 to find the radius as r=2.165 A
then find volume of each atom as $4\pi r^3/3$
then find no. of atoms per cube (see class notes)
packing fraction=no. of atoms x volume of each atom/cube volume=68%

1.3
b1) equivalent planes are those that are:
1) shifted by one lattice constant and thus are parallel to each other or
2) oriented by selection of the xyz axes in the unit cell.
These are shown by{hkl}.
For example all cube faces are equivalent planes.
b2) equivalent directions are those that are:
1) oriented by selection of the xyz axes in the unit cell.
These are shown by <hkl>.
For example all cube diagonals are equivalent directions.

1.12 see class notes.
1.14 Use prob. 1.2 above as your model to solve for packing fraction. For each case find the nearest atoms in each geometry in order to find radius (r) as follows:
SC: r=a/2
BCC: $r=a\sqrt{3}/2$
diamond: $r=a\sqrt{3}/4$