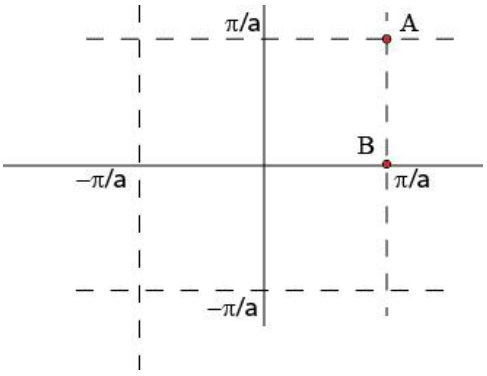
HW 7

1. A. Show that for a simple square lattice (two dimensions, position A) that the kinetic energy of a free electron at a corner of the first zone (see picture below, position B) is higher than that of electron at the midpoint of a side face of the zone (see picture below) by a factor 2.
   B. What is the corresponding factor for a simple cubic lattice (three dimensions)?
   C. Above two questions tell something about the difference in kinetic energy at two points in the first zone. If the kinetic energy at the corner is larger than the kinetic energy at the midpoint of a side + the bandgap energy at the side, do you expect the divalent material to be a conductor or an insulator (read also the last section of the chapter i.e. "Numer of orbitals in a band" (page 180-181).



2. Work problem 3 at the end of the chapter.
3. Rework the derivation of equation (6) on page 167. ☺