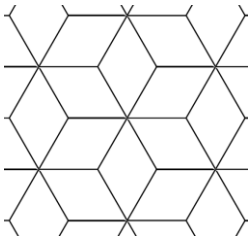
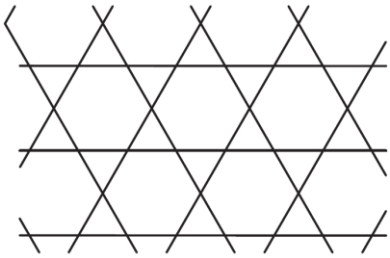
Solid state physics

Problems 1
Deadline: 27. September 2020. 24:00

1) Find the fundamental translation vectors of the following 2D structures. Construct the elementary cell and the Brillouin Zone.





2) Use Eq. (2.6) to calculate the Cartesian coordinates of the fundamentals vectors of **A, B, C,** if the translation vectors are listed below:
   a = d (1, 0, 0)
   b = d (1, 2, 0)
   c = d (0, 0 ,1).

3) What are the unit cells for the NaCl structures? How many atoms are there in these unit cells?
4) Derive from Eq. (2.15) that the equilibrium distance of Lennard-Jones potential is 1.122 σ and the bonding energy is – ε.
5) How does the lattice energy in an ionic crystal depend on the interatomic distance?
6) Why is van der Waals bonding much weaker than most other bonding types?