Tutorial questions - Lectures 2+3

1. Draw an fcc lattice. Choose and mark an origin. Indicate the $(\bar{1}11)$ plane and the (011) plane.
2. In a cubic unit cell with lattice constant of 0.4nm, what is the spacing of the (002) and (113) lattice planes?
3. Explain the difference between the diamond and the sphalerite lattice.
4. Draw the sphalerite lattice. Choose and mark an origin. Mark [110] and $[1\bar{1}0]$ directions. Draw the projection along the [110] and $[1\bar{1}0]$ zone axes. What's the difference?
5. Given the sphalerite lattice, explain what the notation $F\bar{4}3m$ means.
6. In the sphalerite lattice of GaAs a=0.565nm, calculate the lattice spacings of d_{200}, d_{220} and d_{111}.
7. Explain why there is no tetragonal C lattice. What would it look like? Can you find a smaller and simpler unit cell? Similarly: Explain why there is no tetragonal F lattice.
8. Given the wurtzite unit cell in perspective drawing, explain why it is a P lattice type, where the six-fold rotation axis is and where the mirror plane is.
9. Explain why there is an ideal c/a ratio in the wurtzite structure and calculate what it is.
10. Work out and compare the Zn-S bond lengths in zinc blende (a_{cub}=0.542nm) and wurtzite (a_{hex}=0.381nm, c_{hex}=0.623nm) ZnS.