**HW Number 3, Due April 25th**

1. View the video at https://www.youtube.com/watch?v=iiJuG636PfQ then answer the following questions:
    1. For the molybedum oxide sample, why are the diffraction spots discs, not sharp spots?
    2. Does his explanation of the difference between horizontal and vertical distances for aluminum as due to astigmatism completely correct? (Think about it.)
    3. Estimate the error in his values of the a and c lattice parameters, clearly stating how you are defining the error. Think about this, error estimation is not simple!
    4. Do the calculation of how many electrons there are in the sample, stating any assumptions that you make.

2. What is the angle between [720] and (001)?

3.a) Sketch the reciprocal lattice for an bcc crystal.  What is the relationship between this and a fcc cell?
b) Sketch the reciprocal lattice for a hexagonal close packed crystal.

4. For a fcc sample with a lattice parameter of 3.35 Angstroms:
a) Sketch the diffraction pattern along the [111] zone axis, labelling the ZOLZ spots.
b) What is the spacing of the smallest diffraction spot in $nm^{-1}$?
c) What is the excitation error for $(\bar{2}01)$ assuming the beam is exactly down the zone axis?