HW Number 4

1) Assuming kinematical theory, for an excitation error of 0.2 nm-1 for a wedge shaped sample with a wedge angle of 45 degrees, what is the spacing of the thickness fringes in a dark field image? State all assumptions you make.

2) Consider a gold sample imaged close to the [001] zone, tilted by 50 mRad about [100] with the (200) spot in an exact 2-beam condition. Assuming kinematical theory, sketch the dark field image of a square pyramid with four (111) faces and a (001) base when using the ($\overbar{2}00$) diffraction spot, where the width (in projection) of the pyramid is 100nm.

3) Consider question #3 from Homework #3, “For a bcc material, a diffraction pattern taken along [001], all the diffraction spots show streaks running along (100) and (010).”

Using conventional BF/DF imaging design a set of experiments to determine what these are due to in real space.

4) View the video at https://www.youtube.com/watch?v=5kcPa4HEIhQ

 a) Is the wavelength correct for electrons used in electron microscopes?

 b) Why are there rings in the diffraction pattern?