NANO 703/703L - Quiz 3

The Bragg reflections for various types of crystals, which have structures derived from cubic lattices, can be categorized based on their Miller indices:

- For the cubic lattices (**sc**, **fcc**, and **bcc**), the Miller indices of allowed reflections must all be integers, but some reflections may be systematically absent, according to certain rules.
- Some reflections for the **diamond** structure (which has fcc symmetry) are kinematically forbidden.
- For the (001) variant of the ordered CuAu-I structure (**CA (001)**), allowed reflections have h and k both even or both odd. (ℓ can be any integer.) It has no kinematically forbidden reflections.
- For the (001) variant of the ordered chalcopyrite structure (**CH (001)**), allowed reflections have $h+k+2\ell = \text{even}$, where h and k can be any integers, except for those with $h+\ell$ and $k+\ell$ both odd, which are kinematically forbidden.

For the various structures in each column:
Put a "√" in the cell if it is an *allowed* reflection.
Put a "∗" in the cell if it is a *kinematically forbidden* reflection.
Leave the cell blank (or put an "X") if the reflection is *absent*.

$hk\ell$	a) sc	b) fcc	c) bcc	d) diamond	e) CA (001)	f) CH (001)
100						
001						
110						
$1\bar{2}0$						
111						
020						
221						
004						
222						
011						
323						
201						
$01\frac{1}{2}$						
$\frac{1}{2}\frac{3}{2}\frac{3}{2}$						