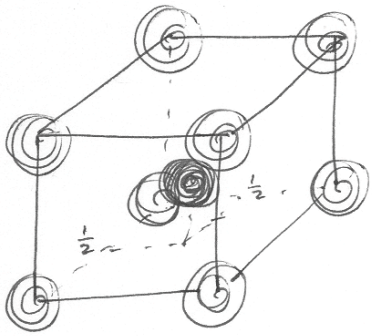
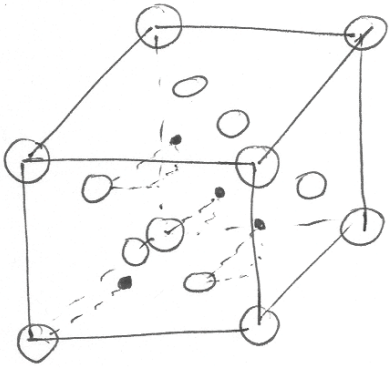
2. Sketch a unit cell of the following crystals:
   a) Copper, which has a BCC structure with base (0,0,0)
   b) Gallium Arsenide (GaAs), which has an FCC structure with Ga atoms at (0,0,0), and As atoms at (¼, ¼, ¼)
   c) Cesium chloride (CsCl) which has a simple cubic structure with Cs atoms at (0,0,0), and Cl atoms at (½, ½, ½).

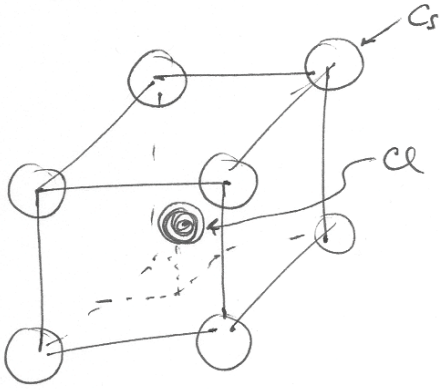
a)



b)

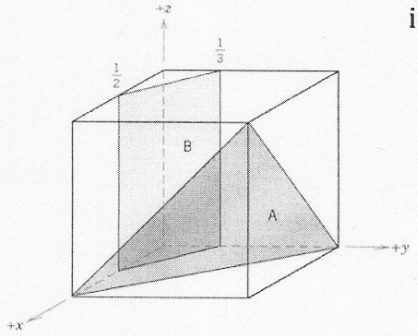


c)



1. Determine the Miller indices for the planes shown in the following unit cells:

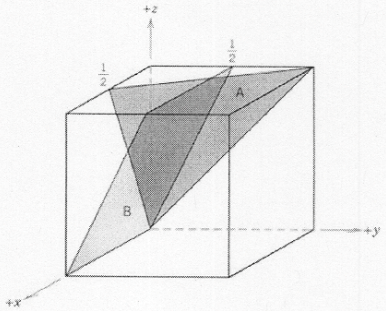
(i)



A: intercepts: $1, 1, -1 \rightarrow (11\bar{1})$

B: intercepts: $\frac{1}{2}, \frac{1}{3}, \infty \rightarrow (230)$

ii)



A: intercepts: $\frac{1}{2}, 1, -1 \rightarrow (21\bar{1})$

B: intercepts: $\infty, \frac{1}{2}, -1 \rightarrow (02\bar{1})$

for B, move the origin one unit cell vertically on the z-axis

2. Using geometrical arguments, derive Bragg's law for a simple cubic system. Make sure to include a drawing with a source, detector, incoming and reflected rays, and the appropriate lengths and angles.

see class notes