Note: These questions will be discussed in the tutorial sessions on September 26.

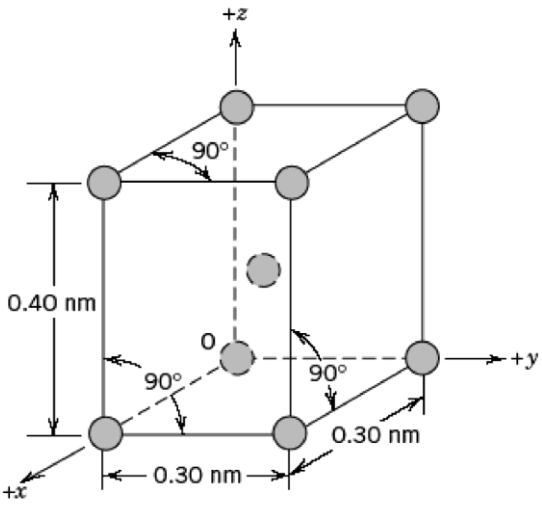
Question 1:

A unit cell is shown for a hypothetical metal.

(a) To which crystal system does this unit cell belong?

(b) What would this crystal structure be called?

(c) Calculate the density of the material, given that its atomic weight is 141 g/mol.



Question 2:

Show that the atomic packing factor for HCP is 0.74.

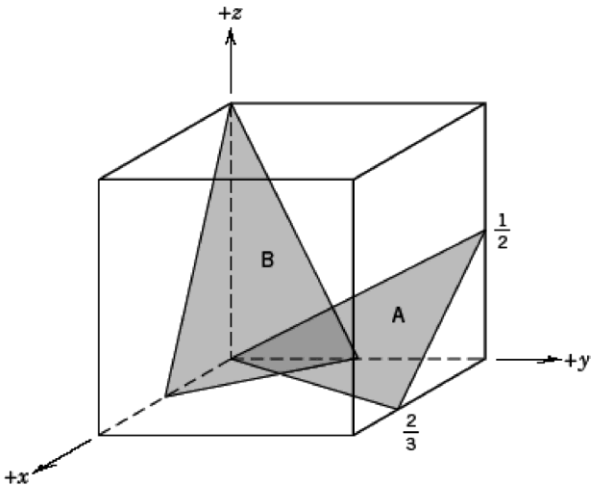
Question 3:

a) Sketch a tetragonal unit cell, and within that cell indicate locations of the $\frac{1}{2}\,1\,\frac{1}{2}$ and $\frac{1}{4}\,\frac{1}{2}\,\frac{3}{4}$ point coordinates.

b) Within a cubic unit cell, sketch the following directions:

$[\bar{1}10]$, $[\bar{1}\bar{1}1]$, $[0\bar{1}2]$

c) Determine the Miller indices for the planes shown in the following unit cell:



Question 4:

Determine the expected diffraction angle for the first-order reflection from the (113) set of planes for FCC platinum when monochromatic radiation of wavelength 0.1542 nm is used.

Question 5:

What is the composition, in atom percent, of an alloy that contains 99.7 lb_m copper, 102 lb_m zinc, and 2.1 lb_m lead?

Question 6:

For a BCC single crystal, would you expect the surface energy for a (100) plane to be greater or less than that for a (110) plane? Why?