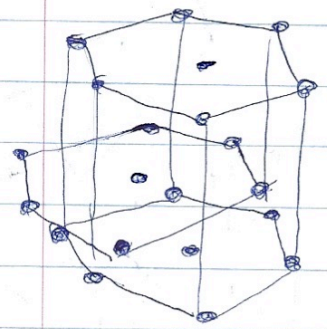
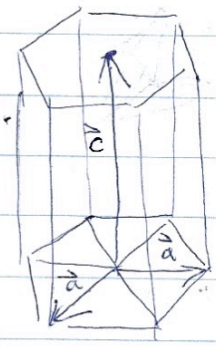
Kittel

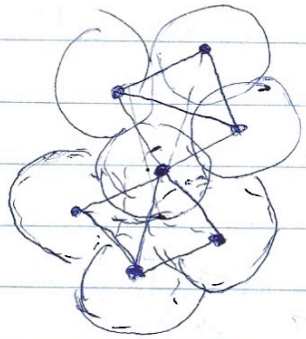
1.3. We consider hexagonally-close-packed structure, characterized by



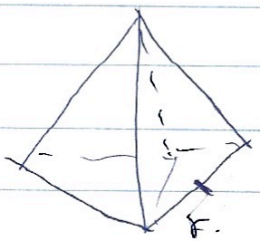
, with primitive cell



The close-packed structure can be given by two tetrahedrons that are vertically aligned,



So the $\frac{c}{a}$ ratio is given by the height of an tetrahedron over its edge length; which can be explicitly computed.



$$\sqrt{(2r)^2 - \left(\frac{2r}{\sqrt{3}}\right)^2} = 2r\sqrt{2/3} = r\sqrt{8/3}$$

$$\frac{2r\sqrt{8/3}}{2r} = \boxed{\sqrt{\frac{8}{3}}}$$