

Physics 8510

Problem Set 5

1) Ashcroft & Mermin P 5.1

2) The Primitive translation vectors of the Hexagonal space lattice A_1 , A_2 and A_3 are given by $A_1 = \sqrt{3}a/2x + a/2y$, $A_2 = -\sqrt{3}a/2x + a/2y$, and $A_3 = c z$.

(a) Show that the primitive cell volume is $(\sqrt{3})/2a^2c$.

(b) Find the reciprocal lattice vectors.

3) Show that the volume of the first B Z is $(2\pi)^3 / V_c$ Where V_c is the volume of a crystal primitive cell.

Vector identity $(\mathbf{c} \times \mathbf{a}) \times (\mathbf{a} \times \mathbf{b}) = (\mathbf{c} \cdot \mathbf{a} \times \mathbf{b}) \mathbf{a}$

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