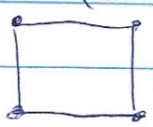
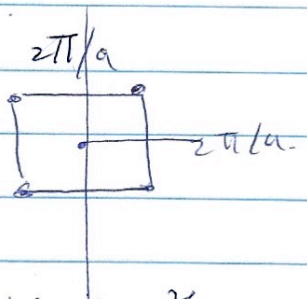
Kittel 5state

7.1(a) The 1st Brillouin zone of a simple cubic lattice is also simple cubic, with side length $\frac{2\pi}{a}$.

Crystal Lattice:



reciprocal lattice:



The coordinate of wave vector on the center of edge on the first Brillouin zone is $(\frac{2\pi}{a}, 0)$ has $k_1^2 = (\frac{2\pi}{a})^2$, the coordinate of wavevector at the corner is $(\frac{2\pi}{a}, \frac{2\pi}{a})$ has $k_2^2 = (\frac{2\pi}{a})^2 + (\frac{2\pi}{a})^2 = 2k_1^2$. The kinetic energy of electron is proportional to k^2.

(b) By same argument, the factor would be $\boxed{3}$ on 3D lattice.

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