

- 1) Make a plot of first two Brillouin zones for a rectangular lattice where $l = 3a$ and $b = a$.
- 2) Represent a 2D electronic metal within the first Brillouin zone for a square lattice. (This is only sketch that must allow Pauli's exclusion principle to play a role in defining conductivity)
- 3) In the same problem sketch a hypothetical hole orbit
- 4) Read the Nobel lecture of Klitzing
- 5) Solve the Kronig Pennely model for a periodic rectangular lattice .
- 6) Solve the Kroning Penney model for a periodic array of Dirac delta functions.
- 7) Extend the calculation of tight binding approximation in class to find the E vs K for a FCC lattice.
- 8) For the tight binding constant g find an expression in terms of Rydberg atoms.
- 9) Review the deHaas Van Alphen effect. What does the frequency that is function of $1/B$ represent
- 10) Review Landau quantization of 2D electrons. Discuss the density of states in k -space and its projection onto real space as discussed in class
- 11) Which field breaks time reversal symmetry. Can you use this to distinguish electrons and holes.