Physics 685 – Electronic Structure

Please read Martin, Electronic Structure, Chapter 3, sections 4-5, Baym, pages 141-146. The goal is to learn about methods of approximating the effect of other electric charges on the orbital occupied by a single electron, particularly the Hartree method, and about the simplest feasible wavefunction that describes multielectron systems, the Slater determinant. Hartree-Fock is another key term.

1. *The hydrogen ion* In Griffiths, do problem 7.7. This is should be quite easy so for a challenge take a stab at 7.18. Why is a more complicated method needed for H^- and not, say, for He?

2. *The normalization of the Slater determinant wavefunction* Show explicitly that Martin's expression for the Slater determinant wavefunction is properly normalized for a 3 by 3 determinant – that is, for a three-electron system. This is Martin, problem 3.10, which invites you to generalize to N particles.