

Physics 216. Quantum Mechanics. Professor Dine

Spring, 2004. Homework Set 1. Due Thurs., April 8.

1. Helium ground state energy variationally: Derive Shankar's eqn.s 16.1.15 and 16.1.16
2. Read Shankar's chapter on the hydrogen atom. Then do Shankar exercise 17.3.4.
3. Work out the wave function for the lowest energy state with $\ell = 0$ in a spherical square well potential, $V(r) = -V_0, r < a, V(r) = 0, r > a$. What is the condition on V_0 and a that there be at least one bound state? Two bound states, etc.? Write down a solution for $\ell = 1$ inside and outside the well, but don't go through the algebra to find the bound state energy.