Topics in Mathematical Physics (PHYS 320):21 Spring 2009

Please choose either **1 or 2**. Both are fine review of the H-atom solutions. The first is "easier" in the sense that $V = 0$ inside the box. The second problem has "$V = (1/2)kr^2$" so the r-dependence of the potential changes. As pretty as this solution is, be forewarned that this problem is also lovely review of limits of ode's and series solutions.

(1) Boas pg. 651 problem 19

(2) Find the energy eigenfunctions and eigenvalues (i.e. solve Schrödinger's equation) for an isotropic harmonic oscillator with the potential

$$V(r) = \frac{1}{2}\mu\omega^2 r^2$$

With a suitable choice of principal quantum number (i.e. separation constant) you will find

$$E_n = (n + \frac{3}{2})\hbar\omega$$

The radial solutions are associated Laguerre poly's of half-integral order.