PHYS2332-Modern Physics II
Winter 2018, Assignment #3

Assigned on Wednesday 31 January. Due on Wednesday 7 February.

Question 1 Indistinguishability of Identical Particles, symmetry, and Pauli Exclusion Principle Consider the particle in an infinite square well of section 6.3 page 212 to 214. Note in particular equations 6.34 and 6.35 of the wavefunction, ψ_n, and energy, E_n, respectively. Consider now two identical particles in an infinite square well. Determine the wavefunctions and energy of the ground state and the first-excited state, for the case where the two particles are A) Identical Bosons and B) Identical Fermions. C) Give a plausible explanation on why the energies of the identical bosons are lower.

Question 2 Energy Level Diagram of Berrylium ion Be^+ For neutral *Be* Z = 4.

(A) Draw the fine-structure diagram of Be^+ that includes all n = 3 states. Label the states in **spectroscopic notation.**

(B) Using the selection rules of equation 8.8 draw all the allowed transitions of Be^+ . Such diagrams are called **Grotian diagrams**.

Do **Problem 21**, **25**, **36**, and **37** of chapter 8. **Note** that for some of the problems the answers are in the back, but you will only be given full marks only if you show sufficient works. For **problem 25** you must explain your answers clearly.