**Physics 217**
**Problem Set 11**
**Due: Friday, Nov 30th, 2018**

1. (10 points)

   (a) If the radial part of a particle's wavefunction is $R(r)$, what is the probability of finding the particle somewhere between radius $r_1$ and $r_2$?

   (b) Write down the radial wavefunction $R_{10}(r)$ for the $n = 1, \ell = 0$ state of the Hydrogen atom. The nucleus of the Hydrogen aton is a proton, which has a radius $r_p = 10^{-15}$ m. Write down an approximate expression for $R_{10}(r)$ which is valid for $r \lesssim r_p$. What is the probability of finding the electron inside the proton?

   (c) Repeat part (b) for the $n = 2, \ell = 1$ state of Hydrogen. Explain the difference between your results.

2. (10 points) Problem 50 from Chapter 7 of the Harris book.

3. (10 points) Problem 60 from Chapter 7 of the Harris book.

4. (10 points) Problem 70 from Chapter 7 of the Harris book.