Physics 237 Due: February 10, 2012
Homework Set # 3 12.00 pm

1. Chapter 3, Problem 7 (page 81).

2. Chapter 3, Problem 14 (page 82).

3. Chapter 3, Problem 19 (page 82).

4. Chapter 3, Problem 20 (page 83).

5. Chapter 3, Problem 25 (page 83).

6. **20 points extra credit:** Use Mathematica to make graphs of the de Broglie wavelength as function of the kinetic energy (in units of MeV) for electrons and neutrons. Plot the wavelength for each particle for two different assumptions:

   a. Assume that the linear momentum p is given by the non-relativistic expression $p = mv$ and the kinetic energy is given by $K = mv^2/2$.

   b. Assume that the linear momentum p is obtained from the relativistic expression $E^2 = (pc)^2 + (mc^2)^2$ and the kinetic energy is equal to $E - mc^2$.

   At what kinetic energy will the difference in the wavelengths calculated using assumption a) and b) be 1%?

   In order to receive the extra credit, you should create a Mathematica Notebook, showing on the relevant calculations and graphs, and submit it electronically to Prof. Wolfs at wolfs@pas.rochester.edu. The name of the file should be hw03p06XXYYYYYYYY.nb where XX are your initials and YYYYYYYY is your student id number. The subject of the email should start with hw03p06XXYYYYYYYY.