Standard Model Problems

1. In a hydrogen atom in the ground state the electron orbits at a radius of 0.053nm at a speed of 2.2×10^6m/s. Find (a)the gravitational force exerted by the proton on the electron, (b)the gravitational force exerted on the proton due to the electron.

2. From the information in problem 1, find (a)the centripetal acceleration of the electron and (b)the total force on the electron. (c)Use your answers and the results of problem 1 to decide whether the gravitational force is significant compared to other forces inside the atom. Justify your answer.

3. Using just the strange and charmed quarks, make as many integer charged particles as you can. Check the Baryon List at Wikipedia to find the names of these particles (http://en.wikipedia.org/wiki/List_of_baryons).

4. Some particles are made from one quark and one anti-quark. An anti-quark is sort of the same as a quark except with an opposite charge. Using only the up (u), anti-up ($\bar{u}$), down (d), and anti-down ($\bar{d}$) quarks, make as many integer charged particles as you can. Check the Meson List at Wikipedia to find the names of these particles (http://en.wikipedia.org/wiki/List_of_mesons).