Ph 201H/211H
F08 Homework – due October 30, 2008

1. The Space Shuttle typically flies in a circular orbit at an altitude of about 300 km above the surface of the Earth. Given the Earth's radius, 6370 km, and mass, 5.97×10^{24} kg, find the Shuttle's orbital speed and the time for one orbit.

2. In the Bohr model of the hydrogen atom, the electron travels a circular path about the proton at a radius of 5.29×10^{-11} m. Given the mass of the electron, 9.11×10^{-31} kg, and the magnitude of the electric charges of the proton and electron, 1.602×10^{-19} C, find the orbital speed of the electron and the time for one orbit.

3. (a) A person whose mass is 60.00 kg is standing on a scale at the equator. Use the value of the Earth's radius and mass given in problem 1 to find the gravitational force exerted on the person by the Earth. (b) Draw a force diagram that represents the person. (c) As the Earth rotates, the person moves in a circular path. What is the centripetal acceleration of the person? (d) The scale reading is the normal force exerted by the scale on the person. On the rotating Earth, the normal force is NOT equal to the person's true weight. Find the numerical value of the scale reading.