Physics 3344
Homework 13 22 Apr 2008
Due Tues, Apr 29

1. Read the remainder of Marion, Ch 7.

   True/False: I read this material.

2. Marion Ch 7, Problems 26(b), 34

   For problem 7.26(b), use the equations you derive to determine the acceleration for your coordinate (Simple). (Don't neglect the moment of inertia I for the disk.)

   For problem 7.34(b), by "reaction of the wedge" Marion means the normal force (the force of constraint) that the wedge exerts on the mass.

3. A uniform, solid ball of mass M has a string wrapped around its equator. One end of string is held fixed while the ball is allowed to fall vertically downward. The string unwraps as it falls, but otherwise doesn't slip (similar to a yo-yo).
   (a) Use the method of Lagrange multipliers to solve for the height of the ball's center as a function of time.
   (b) Find the tension in the string.
   (It might help to recall that the moment of inertia for a solid sphere about its center of mass is $(2/5)MR^2$, and that the kinetic energy may be broken into contributions from the linear motion of its center of mass, and from rotations about the center.)

4. Find Hamilton's equations of motion for a particle moving in a central potential $U(r)$; that is, a potential which only depends on the radial distance r. (I'd recommend spherical coordinates.) (The equations will be in terms of U or derivatives of U.)