Physics 5300, Theoretical Mechanics  Spring 2015

Quiz 7

Given: Friday Feb 27

Problem 1  Consider the Atwood machine, with the pulley being a uniform disc with a mass $M$ and a radius $R$. The two masses connected by a massless string are $m_1$ and $m_2$. Use the vertical position $y$ of the mass $m_1$ as a generalised coordinate. [Note that the moment of inertia of a uniform disc about its central axis is $\frac{1}{2}MR^2$.]

(a) Write the Lagrangian. (3 points)
(b) Find the generalized momentum $p$. (2 points)
(c) Find the Hamiltonian. (2 points)
(d) Solve Hamilton’s equations to get $\ddot{y}$. (3 points)