

Physics 106A: Classical Mechanics

Homework 1: Hamiltonian Formulation of Mechanics

DUE: Thursday, January 11 20001

Remember: Late homework will be granted 50% credit UNLESS PRIOR ARRANGEMENTS ARE MADE WITH ME OR A TA. If you have an extension, please indicate who granted it clearly on the top of the paper OR YOU WILL NOT GET FULL CREDIT.

Reading Assignment: Hand and Finch Chapter 5

1. H&F Chapter 5, Problem 4

2. H&F Chapter 5 Problem 6

3. H&F Chapter 5 Problem 11

4. A uniform cylinder of radius a , and density ρ is mounted so as to rotate freely around a vertical axis. On the outside of the cylinder is a rigidly fixed uniform spiral or helical track along which a mass point m can slide without friction. Suppose a particle starts at rest at the top of the cylinder and slides down under the influence of gravity. Using any set of coordinates, arrive at a Hamiltonian for the combined system of particle and cylinder, and solve for the motion of the system.