

Portland State University

Department of Physics

Assignments for Presentation

PH 624: Classical Mechanics

Instructor: M.A.K.Khalil

Problem Set 1 (Chapters 1 and 2)

H. Goldstein, C.Poole and J.Safko, Classical Mechanics, (Addison Wesley, N.Y., 2002)

Numbers at the end indicate my estimate of difficulty: 1 = “not very difficult”, 5 = “impossibly difficult”.

Chapter 1:

- Almutairi.** 1.10 - Invariance of the Lagrangian under point transformations 1
Amin. 1.14 - Generalized coordinates 1
Barnum. 1.18 - Unraveling motion from a Lagrangian. To complete the problem, solve the equations of motion and describe the solutions. 2
Comnes. 1-20 - Unraveling motion from a Lagrangian . Hint: After finding the EoM factor it into the product of two pieces - one is $(ma + dV/dx)$. 2
Cooper. 1-21 - Using Lagrange's equations. Classic case. Get 1st integrals of both EoMs. 2
Crawford. 1-22 - Lagrangian for a double pendulum - A bit tedious. 2

Chapter 2

- Fowler.** 2-12 - Generalized mechanics - jerky mechanics - also tedious -3.
Hint: Follow the procedure in the book for the derivation of the Lagrange equations. You have to do the integration by parts several times.
Grist. 2-13 - Rolling constraints - 2- Lagrange multipliers.
Hopkins. 2-x - Wedge and block by Lagrange multipliers - continuation of class example -2. Two blocks of masses m and M are connected by a rope which is draped over a right angled wedge. There is no friction. Determine the motion and the forces of constraints. -
Hudson. 2-16 - Motion from a Lagrangian, point transformations, conserved quantities - 2
Illyas. 2-18 - Governor- constants of the motion - 3
Karmaker. 2-24 - Action integrals -3.