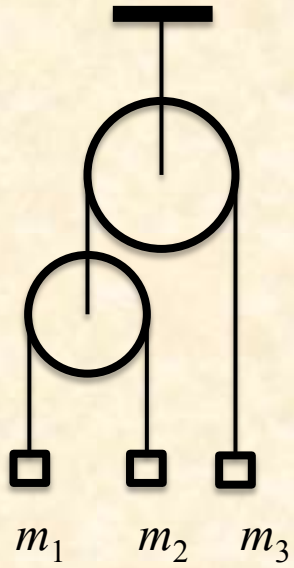
Set #8 - for Wednesday March 5

Read RHK Ch. 14
K&K Ch. 9 including note 9.1 p. 403

Solve

From RHK	**Ch. 14**	Exercise 28, Problems 8, 25
From K&K	**Ch. 9**	Problem 9.2, 9.4, 9.8, 9.10, 9.12
	Ch. 8	Problem 8.1

Problem 1. *A double Atwood machine* is shown in the figure.
a) Pick a proper set of independent generalized coordinates and construct the Lagrangian for this system.
b) Obtain the Euler-Lagrange equations for this system.
c) Solve for the acceleration of the masses in terms of m_1, m_2 and m_3.
d) Use the Lagrangian method to decide if the energy of this system is conserved.



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Problem 2. A particle of mass m is subject to an attractive central force of magnitude k/r^2, k being a constant. If at the instant when the particle is at an extreme position in its closed orbit, at a distance d from the center of force, its speed is $\sqrt{k/2md}$, find

(a) the other extreme position,

(b) show the speed of the particle at this position is $3\sqrt{k/2md}$.

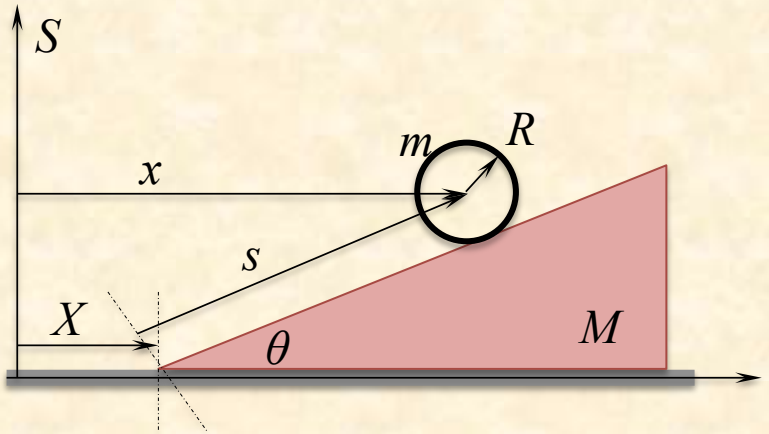
Extra Credit. A hoop of mass m and radius R rolls without slipping down an inclined plane of mass M which makes an angle θ with the horizontal. The plane can slide along a horizontal frictionless surface.

a) Find the Lagrangian of this system.

b) Write down the Lagrange equations of motion.

c) Find any conserved quantities during the motion.

d) Verify that when the incline is not allowed to move you recover the equations of the elementary problem of a hoop rolling down an incline.



Good Luck, Dr. B