Set #5 - for Wednesday February 12

Read RHK Ch. 17
K&K Ch. 8: 8.1-8.3; Ch. 10: Note 10.1, Note 10.2
Feynman Ch. 23, 24, 25

Solve

From RHK	**Ch. 9**	Exercise 24, 32	
	Ch. 17	Exercise 44	Problems 6, 7, 13, 15, 26
From K&K	**Ch. 10**	Problem 10.5, 10.7	

Problem 1. In the oscillator system shown below, the spring constant of the middle spring is twice that of each of the other two springs. In the equilibrium configuration of this system there is no tension in the springs.

a) Find expressions for the acceleration of the blocks in terms of x_1 and x_2 (respective displacements from the equilibrium positions) and ω_0 (where $\omega_0{}^2 = k/m$).

b) Find the normal frequencies of this system.

c) Determine the normal modes corresponding to each of the normal frequencies found in part (b).

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Problem 2. A damped oscillator is described by the equation

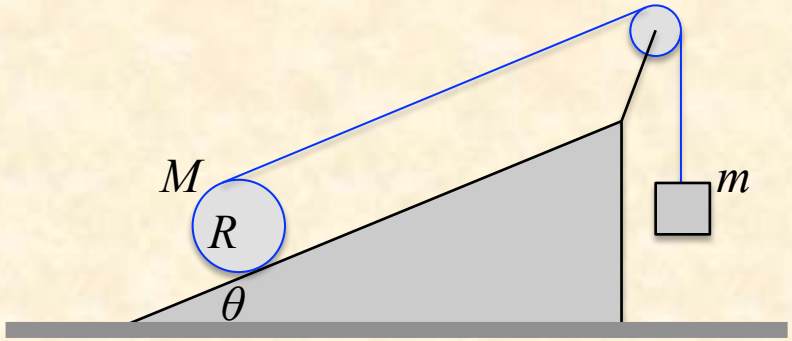
$$\ddot{x} + 10\dot{x} + 25x = 0$$

where x is measured in centimeters and t in seconds.

a) Does it oscillate? If so, find the frequency

b) Write down $x(t)$ satisfying the initial conditions: $x_0 = -1.0$ cm and $\dot{x}_0 = 2.0$ cm/s.

Problem 3. A solid cylinder of mass M and radius R has a light thin tape wound around it. The tape passes over a light, frictionless pulley to an object of mass m hanging vertically. The plane on which the cylinder moves is inclined an angle θ to the horizontal. Find
(a) the linear acceleration of the cylinder down the incline
(b) the tension in the tape, assuming no slipping.



Good Luck, Dr. B