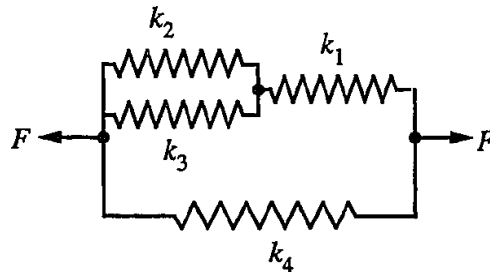


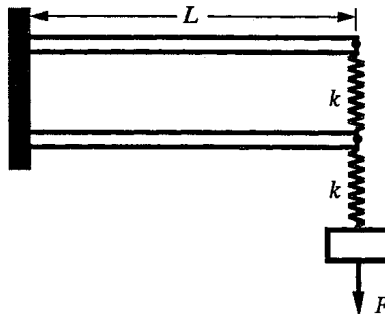
**Homework #1**  
EMA 545, Spring 2013

**Problem 1:** 1.1 from Ginsberg:

**1.1** Determine the spring stiffness that is equivalent to the action of the four springs in the sketch.



**Problem 2:** Find the equation of motion of the system pictured below. The mass of the block is  $m$  and the mass of the beams and springs is negligible. Assume that all of the displacements are very small. (Recall that the displacement of the tip of a cantilever beam,  $\Delta_{\text{tip}}$ , is related to the force at the tip by:  $F_{\text{tip}} = (3EI/L^3)\Delta_{\text{tip}}$ )



**USE COMPLEX EXPONENTIALS** to derive the solution to problems 3-6 (i.e. do not simply look up a trig identity).

**Problem 3:** 2.3 from Ginsberg

**Problem 4:** 2.5 from Ginsberg. Note that “this quantity” in the last sentence is referring to “the complex amplitude of  $dv/dt$ .”

**Problem 5:** 2.8 from Ginsberg.

**Problem 6:** 2.10 from Ginsberg.

**Extra: (this problem will not be graded)** If you are not already familiar with Matlab, review the Matlab® tutorial on the EMA 545 course website (created by Prof. Negrut).