A. Derive the equation of motion for the frame shown below. The flexural rigidity of the beam can be considered infinite. The column flexural rigidities are as noted. Assume that the mass of the beam is $m$ and may be lumped at the beam mid-span. Assume that the frame is massless and omit damping for the present. Compare the result for the fixed base case with the system stiffness defined by,

$$k = \frac{24EI_c}{h^3}$$
B. Starting from the basic definition of stiffness, determine the effective stiffness of the combined spring and write the equation of motion for the spring-mass system.

I.

II.

III.