CEE 379 **Problem Set 8** **Autumn 2007**

(Due in-class, or Monday, Nov. 5th, 4:30 pm)

You can work in groups of 2-4 to complete this assignment. Turn in only one assignment per group. Write the names of all members of the group on this sheet.

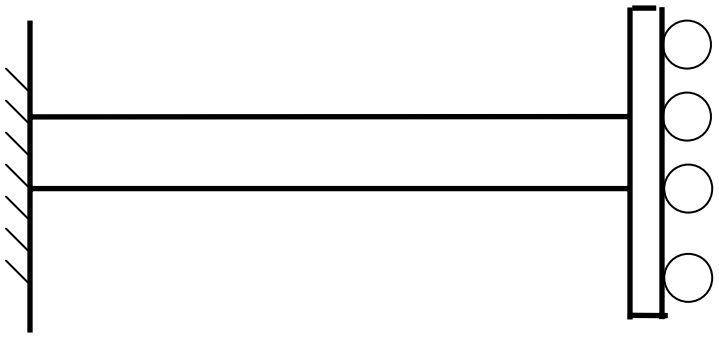
Names: 1. _____

2. _____

3. _____

4. _____

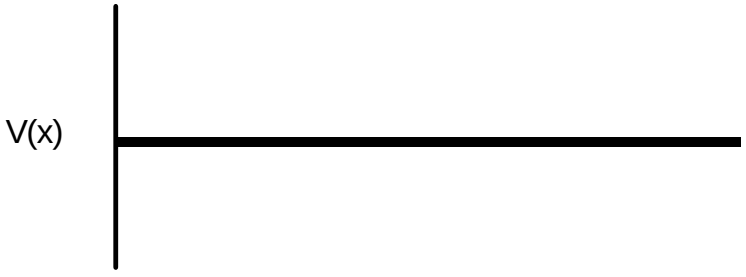
In this problem, you will derive the values for the first and third columns of the 1D beam stiffness matrix by considering the fixed-fixed beam shown below. Assume that the elastic modulus, E, and moment of inertia, I, are constant along the length of the beam.

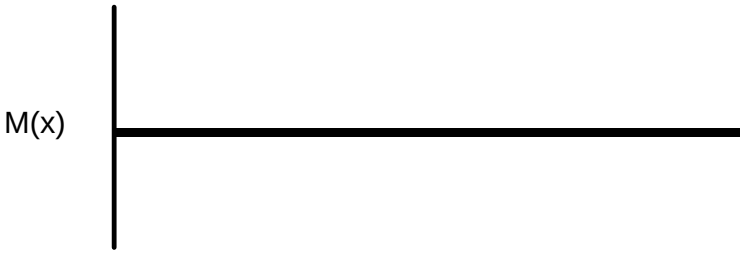


a) Using the beam equation derived in class (i.e., EIv(x)"" = w(x)= 0.0), compute the beam deflected shape, v(x), if end N is restrained from rotating and displacing, while end F is raised by a displacement equal to $d_{Fy'}$, and end F is restrained from rotating.

NEATLY sketch the deflected shape of the beam.

b) Using the solution for v(x) and its derivatives, plot the beam's shear diagram and bending moment diagram using the beam sign conventions presented in class.





c) Determine the end vertical forces and end moments at each end of the beam. Show these end forces and moments on a neat sketch of the beam.

d) Based on this solution and the solution provided in the class handout, write the stiffness matrix for the 1D Beam.

q_{Ny} d_{Ny}

m_N θ_N

q_{Fy} d_{Fy}

m_F θ_F