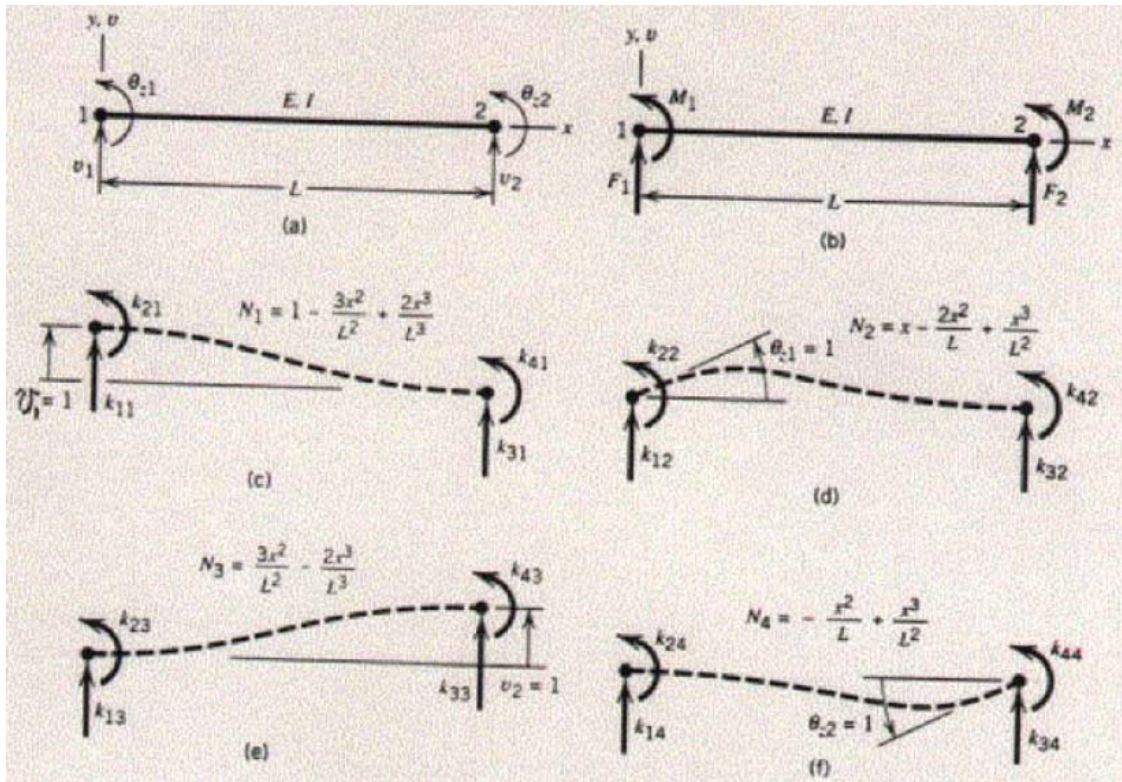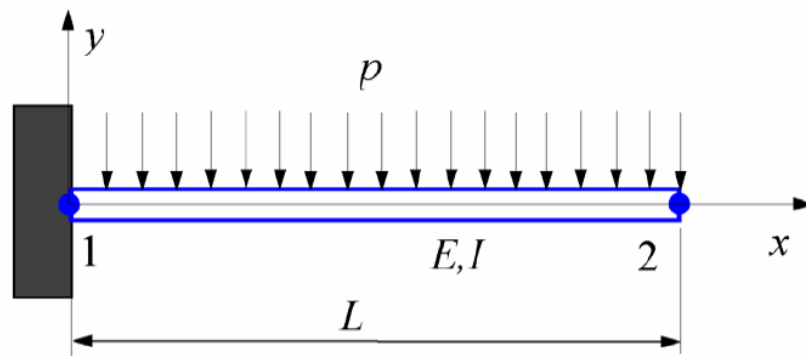MENG 412
Homework Assignment 5
Due Tuesday: 6/6/1425 H

Q1. Show how one can derive the mode shape functions of the beam element using the direct approach.
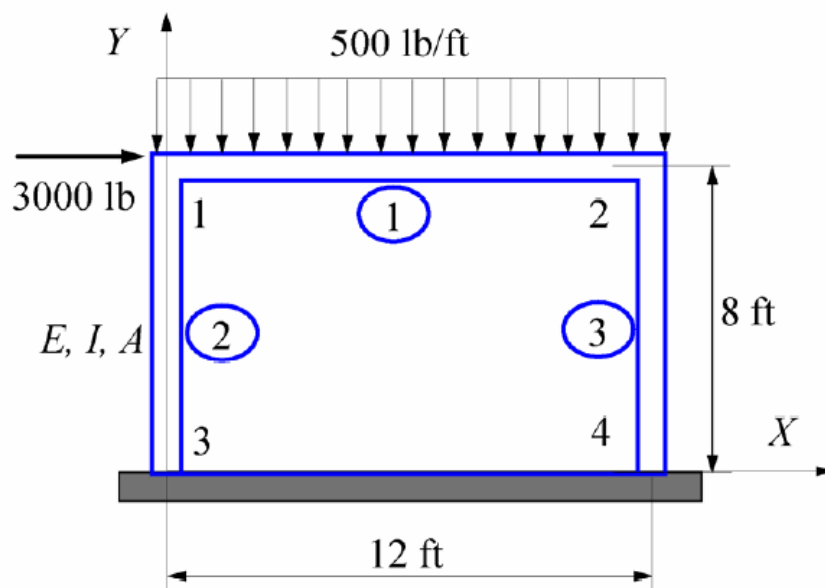

(a)

(b)

$$N_1 = 1 - \frac{3x^2}{L^2} + \frac{2x^3}{L^3}$$

(c)

$$N_2 = x - \frac{2x^2}{L} + \frac{x^3}{L^2}$$

(d)

$$N_3 = \frac{3x^2}{L^2} - \frac{2x^3}{L^3}$$

(e)

$$N_4 = -\frac{x^2}{L} + \frac{x^3}{L^2}$$

(f)

Q2.

Given: A cantilever beam with distributed lateral load p as shown above.

Find: The deflection and rotation at the right end, the reaction force and moment at the left end.

Q3.

Given: $E = 30 \times 10^6$ psi, $I = 65$ in.^{4} , $A = 6.8$ in.^{2}

Find: Displacements and rotations of the two joints 1 and 2.