2.094

FINITE ELEMENT ANALYSIS OF SOLIDS AND FLUIDS

SPRING 2008

Homework 3

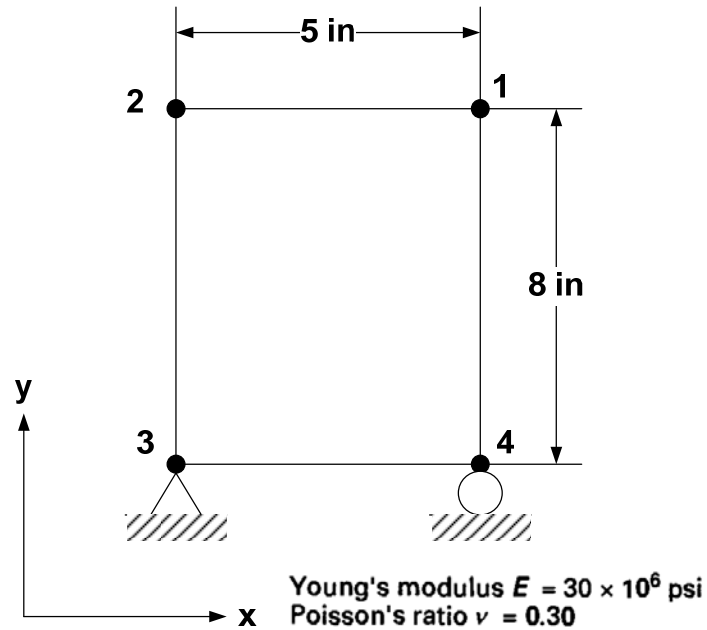|		Assigned:	02/21/2008
Instructor:	Prof. K. J. Bathe	Due:	02/28/2008

Problem 1 (10 points):

The four-node plane strain element shown is subjected to the constant stresses

$$\tau_{xx} = 20 \ psi$$
$$\tau_{yy} = 10 \ psi$$
$$\tau_{xy} = 10 \ psi$$

Calculate the nodal point displacements of the element.

Young's modulus $E = 30 \times 10^6$ psi
Poisson's ratio $v = 0.30$

Problem 2 (20 points):

Consider the element 4 in Fig. E4.9 in the textbook (p.180-181).

(a) Show explicitly that

$$F^{(4)} = \int_{V^{(4)}} B^{(4)^T} \tau^{(4)} dV^{(4)}$$

(b) Show that the element nodal point forces $F^{(4)}$ are in equilibrium.

Problem 3 (10 points):

Exercise 4.15, p. 221-222 in the textbook.

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Spring 2011