2.094

FINITE ELEMENT ANALYSIS OF SOLIDS AND FLUIDS

SPRING 2008

Homework 3

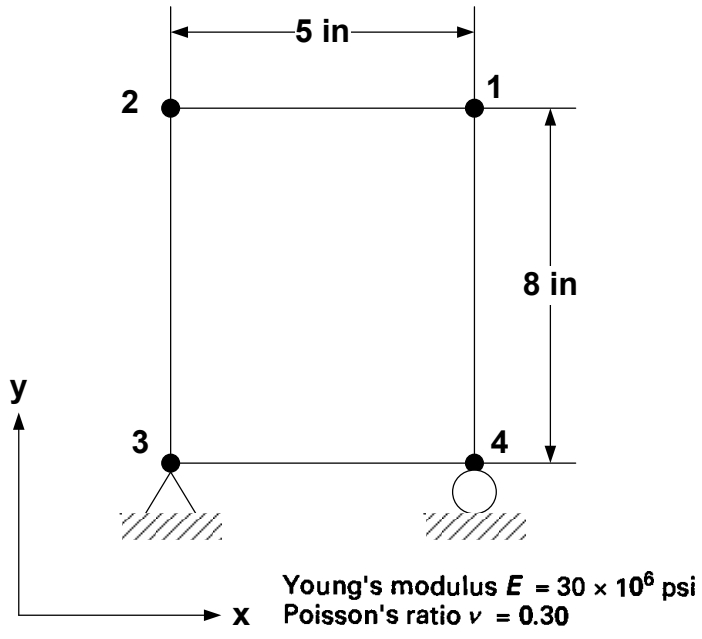
Instructor:	Prof. K. J. Bathe	Assigned:	02/21/2008
TA:	Do-Nyun Kim	Due:	02/28/2008

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.



Problem 2 (20 points):

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

(a) Show explicitly that

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

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

Problem 3 (10 points):

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