

ME 5339
HOMEWORK SET NO. 8

Due Apr. 1, 2008
(All of the problems will be graded.)

Problem 8.1

A cantilevered beam is subjected a uniformly distributed load, q . The beam has its length, L , depth, h and width, b . The Young's modulus of the material is E .

Determine:

- a) the bending strain energy, U_b
- b) the strain energy due to the transverse shear, U_v
- c) the ratio of U_b/U_v , if the ratio, $h/L=1/3$ and $1/2$.
- d) the maximum deflection of the beam using Castigliano's theorem for both h/L ratios.
- e) the slope at the free end both h/L ratios.

Problem 8-2 (10 points)

Using Castigliano's theorem, determine the deflection and slop at **free end** of the beam as shown below. The moment of inertia of the beam 2 is twice of the beam 1 ($I_2= 2 I_1$).

