

ASEN 5007 Introduction to Finite Element Methods Fall 2009

Homework Assignment # 10, covering Chs. 23-24.

Due Thursday, Dec 3, 2009 (Dec 10 for CAETE students)

Please do not forget to attach this cover sheet to your returned homework and write your name(s) on it

Two exercises: (reduced to one 12/2/09)

Exercise 23.4 (derivation of quadrilateral shape functions and element programming) [skipped because of exercise number error]

Exercise 24.2 (derivation of triangle shape functions and element programming)

Grading weights: give at the start of each exercise.

For Exercise 24.2 derive the 5 shape functions first. Note that midnodes 4 and 5 are on sides 1–2 and 2–3, respectively. One way is to start with the 3 shape functions of the 3-node triangle $\hat{N}_i = \zeta_i$, ($i = 1, 2, 3$); then for the corner functions apply corrections $N_i = \hat{N}_i + c_i \zeta_1 \zeta_2 + d_i \zeta_2 \zeta_3$ for $i = 1, 2, 3$, with c_i and d_i determined so that $N_i = 0$ at 4 and 5. The midnode shape functions are $N_4 = 4\zeta_1 \zeta_2$ and $N_5 = 4\zeta_2 \zeta_3$. Check that the sum of the five is exactly one before setting out to programming it.

To speed up programming, you may want to download the Notebooks posted in the index of Chapter 24. Some code, such as the Gauss quadrature info modules, may be reused without change. Other modules may be used as "templates" for cut-and-paste work.

Final Exam Information

The final take-home exam will be posted on the course web site on Wed Dec 9, 2009.

On-campus students will have 6 days to return it to instructor.

For CAETE students, instructions for returning the final exam will be sent directly by e-mail. Since it is take-home, it does not to go through the EO: exam can be downloaded directly from the Web.