10:20 - 10: 55
34-101

Name _____

Unified Quiz TMS4

November 19, 2008

M - PORTION

- Put your name on each page of the exam.
- Read all questions carefully.
- Do all work on that question on the page(s) provided. Use back of the page(s) if necessary.
- Show all your work, especially intermediate results. Partial credit cannot be given without intermediate results.
- Show the logical path of your work. Explain clearly your reasoning and what you are doing. *In some cases, the reasoning is worth as much (or more) than the final answers*.
- Please be neat. It will be easier to identify correct or partially correct responses when the response is neat.
- Be sure to show the appropriate units throughout. Answers are not correct without the units.
- Report significant digits only.
- Box your final answers.
- ***Calculators are allowed.***
- ***Print-outs of Handout "HO-M-7" along with 2 sides of pages of handwritten material are allowed.***

EXAM SCORING

#1M = FINAL SCORE	

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PROBLEM #1M

A large slab of a relatively compliant material is in the x_2- x_3 plane. This slab is outfitted with strain gages and the slab is loaded by stresses along multiple axes. While undergoing this multiaxial stress state, it is determined that the strain gages show that the strains are:

$$\varepsilon_{22} = -4000\ \mu\text{strain} \quad \varepsilon_{33} = +8000\ \mu\text{strain} \quad \gamma_{23} = +10{,}000\ \mu\text{strain}$$

where the shear strain is engineering shear strain. It is furthermore known that the strain does not vary through the thickness of the slab, i.e. with x_1, and any strains involving the x_1-direction are equal to zero.

(a) Can one draw a rectangle on the slab of material that will maintain its shape as a rectangle? If not, why not? If so, what is its orientation? How will its rectangular aspect ratio change in that case, if at all? **Clearly explain your reasoning**.

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PROBLEM #1M

PROBLEM #1M

(b) The stresses are altered along the various axes, but this does not result in a change in the strains measured by the strain gages, or any in the x_1-direction. Will this change the deformation of the slab? **Clearly explain your reasoning.**

PROBLEM #1M

(c) The loading is now changed so that the deformations are increased by a factor of thirty. How will this affect the values of the in-plane strains? **Clearly explain your reasoning.**