Name _____

Unified Quiz TM3
October 29, 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 <u>cannot</u> be given without intermediate results.
- Show the logical path of your work. Explain <u>clearly</u> 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-5" along with 2 sides of pages of handwritten material are allowed.***

EXAM SCORING

#1M = FINAL SCORE	

PROBLEM #1M

A three-bar truss is pinned at the junction of the three bars. Each bar is supported at its base via a pin support. The overall structure, prior to being loaded, has a height of L and length of 2L, with the pin support, B, of Bar 2 at the mid-point. Bar 2 is initially vertical. A load of magnitude P is applied at the junction of the bars at an angle of θ (measured positive counterclockwise) to the x_1- x_3 coordinate system. The bars have force-displacement relations of: $\delta_{bar} = PL_{bar} / (EA)_{bar}$ and the EA of all bars is the same.
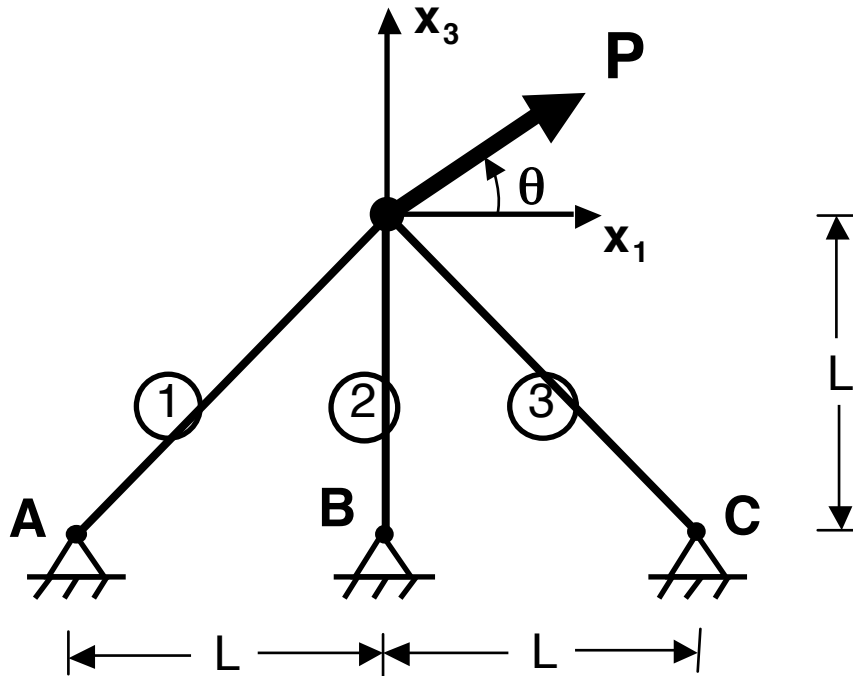
(a)   What is the "class/category" of this structural configuration (Dynamic, Statically Determinate, Statically Indeterminate)? **Clearly** explain your reasoning.

PROBLEM #1M (continued)

(b)   Set up the equations available to determine the bar loads and reactions. **Clearly explain** the approach needed and the steps taken. Indicate whether there are sufficient equations to determine the loads or indicate the additional information needed for such. **Do not solve the equations.**

PROBLEM #1M (continued)

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PROBLEM #1M (continued)

(c)   Indicate if the pertinent equations can be simplified if it can be assumed that the deflections of the junction of the bars are small and that any changes in the angles of the bars can be ignored. If the equations can be simplified, indicate how.

PROBLEM #1M (continued)

(d)   If equations are simplified via assumptions of small deflections and relative angle changes, indicate (generically, not specifically with numbers for these equations) how such assumptions would be checked once the solutions of the simplified equations are obtained.