1023-P5-147   **Matthew E DeLong*** (`mtdelong@taylor.edu`), 236 W. Reade Ave., Upland, IN 46989, and **Dale J Winter** (`amanitav@umich.edu`), Department of Mathematics, 530 Church St., University of Michigan, Ann Arbor, MI 48109. *Students' Intuitive and Formal Solutions of Calculus Optimization Problems.*

Selden, et al. (1994) showed that even good calculus students had difficulty solving non-routine problems. One of the most notoriously difficult classes of problems for calculus students to master is optimization problems. In this study we examined students' abilities to both intuitively (without using calculus) and formally (using calculus) solve a non-routine optimization problem. Intuitive solutions from several hundred students at two different Midwestern universities were analyzed. Three distinct levels of student intuitive understanding emerged: boundedness, monotonicity and accuracy. Formal solutions from a subset (n = 26) of these students were also analyzed along four domains: conceptual understanding of problem, conceptual understanding of solution, creation of mathematical model, and proficiency with algebra and calculus. Although these latter students had just completed a unit on optimization in first-semester calculus, as in Selden, et al. very few of the students could successfully solve the problem. In this talk we will report on the distribution of students in the three categories of intuitive understanding and on the levels and types of student difficulties with the formal solutions. Implications for the teaching of calculus will also be discussed. (Received August 12, 2006)