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Judith H. Hector* (judy.hector@ws.edu), Walters State Community College, 500 S. Davy Crockett Pkwy., Morristown, TN 37820. *Improving Pre-Service Teachers' Calculus Understanding Through CAS Programming.*

Prospective secondary school mathematics teachers study calculus early in their major. A computer algebra system (CAS) allows students to move seamlessly between symbolic, numeric, graphic, and textual contexts as they acquire conceptual and practical knowledge of the derivative and integral. This talk advocates that pre-service teachers learn to use a CAS programming language to improve their understanding of calculus. The author introduces basic programming structures of IF-THEN decisions, counting, summing, and looping in both calculus and mathematical programming courses. The CAS programs reinforce problem solving approaches to such topics as root finding using Newton's method, finding area using sums, and approximating polynomials using Taylor's Theorem. Students run, read, modify and write CAS programs on calculus topics. The tool of CAS programming involves students in problem analysis, mathematical modeling, and exploration that extend their experiences beyond the limitations of pre-programmed software. As students program, they generalize, abstract, and encounter different ways of thinking about and manipulating calculus objects. CAS programming languages are also an effective replacement for older languages such as FORTRAN or BASIC. (Received June 29, 2005)