

**School of Computer Science
M.S. Thesis Defense**

**By
Peter Reid**

Automatic Differentiation in ACL2

ABSTRACT

We describe a mechanically verified symbolic differentiator created in ACL2(r), the real-number extension of ACL2. This system builds on work that formalized some core theorems of calculus, such as the mean value theorem and the product rule for differentiation. At its core, it generates derivatives and proofs of their correctness by recursively applying various composition theorems. A collection of derivatives for exponential, logarithm, and trigonometric functions, among others, provide starting points for those composition theorems. The end result is a system capable of differentiating, in a provably correct way, any elementary function. Furthermore, a user can extend the system to differentiate functions of their own definition.

Date: Tuesday, April 26, 2011

Time: 1:00 p.m.

Place: Devon Energy Hall, room 226

**Committee members: Dr. Rex Page – Chair
Dr. Dean Hougen
Dr. Ruben Gamboa**

Reading Copy available in Computer Science Graduate Assistant's office DEH 105

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