1056-49-673   **Joanna M. Papakonstantinou*** (`jpapa@rice.edu`), Rice University, Department of CAAM - MS 134, 6100 Main Street, Houston, TX 77005-1892. *Origin and Extensions of the Secant Method and Characterizations of the BFGS Secant Method.* Preliminary report.

Many people believe that the secant method arose from Newton's method using finite difference approximations to the derivative. In this talk, it is revealed that a special case of the secant method predated Newton's method by more than 3000 years. The evolution of secant methods is traced from 18th-century B.C. Babylonian clay tablets and the Egyptian Rhind Papyrus. As the secant method evolved, widespread confusion concerning the origins and the terminology used to refer to the secant method and the Regula Falsi method arose. To remove the existing confusion, the origins of these methods are determined and the terminology is clarified. Modifications to Newton's method that yield secant methods are discussed and the construction of several rank-two secant update classes are examined. The BFGS secant method is the preferred secant method for finite-dimensional unconstrained optimization. New characterizations of several secant update classes known to contain the BFGS update are presented. (Received September 15, 2009)