1014-39-1614 **Phil Thrift*** (thrift@utdallas.edu). ***j-calculus****: a foundation for discrete analysis.*

I introduce the j-calculus, a mathematics for discrete analysis based on the "finite mathematics" of Mycielski and Lavine. Mycielski shows that for every first-order theory T there is a corresponding locally finite theory Fin(T) that preserves provability and consistency. (A theory is locally finite if every finite set of its theorems has a finite model.) j-calculus (j- stands for jillion) is then defined as j-calculus = Fin(calculus), the finite theory corresponding to (standard differential and integral) calculus. Sentences of calculus translate into sentences of j-calculus by relativizing the quantifiers to a series of domains, each domain seen as larger than the one before, but all finite. The j-calculus is constrasted with another approach (the h- and q-calculus) of Kac and Cheung. Discrete versions of differential equations and dynamical systems are presented in the j-calculus setting. Finally, the stochastic j-calculus and stochastic j-differential equations is introduced. (Received September 28, 2005)