

1125-VR-1529 **William Freed*** (william.freed@concordia.ab.ca), Concordia University, 7128 Ada Blvd., Edmonton, Alberta T5B 4E4, Canada. *The Joys of Teaching Infinitesimal Calculus*. Preliminary report.

Infinitesimal calculus, aka non-standard analysis, greatly increases student enjoyment of and proficiency in the first calculus course. Calculus terms are self-explanatory, dy/dx vs $f'(x)$; the definite integral symbol is not just a name but live mathematics. The differential is basic, not just a gimmick to be converted into an approximation formula or to make the change the change of variable method of integration seem intuitive. Derivation of formulas in general are more straight forward. Proofs of the Extreme Value Theorem or the Riemann Integrability of a Continuous Function over a Closed Interval are intuitive and short. Infinitesimal methods were used by the discoverers of the calcul. The absence of proof of the existence of infinitesimals was always a blight on the otherwise very productive subject of the calculus. In the mid-twentieth century Abraham Robinson showed infinitesimals could be introduced in a consistent mathematical way. Robinson's work is inaccessible to beginning calculus students and just postulating the existence of infinitesimals is unsatisfying. The presenter gives a quasi-rigorous demonstration of the existence of infinitesimals. Some of the highlights of elementary infinitesimal calculus are shown. (Received September 17, 2016)