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Craig G. Fraser* (cfraser@chass.utoronto.ca), IHPST, Victoria College, University of Toronto, Toronto, Ontario M4K 3A4, Canada. *On a Result of Lagrange in the Theory of Infinite Series*. Preliminary report.

In the paper "Sur une nouvelle espèce de calcul relatif à la différentiation et à l'intégration des quantités variables" (1774) Joseph-Louis Lagrange proved the following result. Let $u=u(x)$ be a function of x . Then the derivative of u is given in terms of the finite differences Δu , $\Delta^2 u = \Delta(\Delta u)$, $\Delta^3 u = \Delta(\Delta^2 u)$, ... by the formula

$$\frac{du}{dx} \Delta x = \Delta u - \frac{\Delta^2 u}{2} + \frac{\Delta^3 u}{3} - \dots$$

Lagrange derived this result using analogical reasoning applied to a power series in which the place of the variable was taken by an operation. The paper discusses Lagrange's derivation, his extension of power series to operations, and his use of analogical reasoning. His treatment is compared to some earlier work of Leonhard Euler from the 1750s on infinite series with operations, and to a derivation given by Sylvestre Lacroix in 1806 of the same result. (Received September 21, 2005)