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**Paul R. Bouthellier\*** (pbouthe@pitt.edu), 504 East Main Street, University of Pittsburgh-Titusville, Titusville, PA 16354. *Charles Babbage and the Difference Engine 1.*

In this talk we shall discuss Charles Babbage's Difference Engine 1, which was to construct tables of values for functions, such as logarithms, for the British Government. Such tables were indispensable in areas such as navigation. The problem was that at the time, the 1830s, such tables had to be constructed by hand and were hence extremely labor intensive and subject to calculational and printing errors. To allow such tables to be created and printed more accurately, Babbage designed the Difference Engine 1 (DE1), which was to be powered by steam. The architecture of the device was based on its mathematical requirements. To create tables of approximate function values, Babbage approximated the functions by 6th order polynomials and calculated a set of initial values of the functions and their corresponding finite differences. These initial values and finite differences would allow the Difference Engine to compute the remainder of the values in the desired table. The machine's ability to compute finite differences gave the machine its name: the Difference Engine. The main point of this talk is that today, almost 200 years later, we still need to first derive the mathematics behind how we compute, then engineer the machine to carry out the mathematical operations. (Received June 22, 2015)