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**Paul R. Bouthellier\*** (pbouthe@pitt.edu), 504 East Main Street, University of Pittsburgh-Titusville, Titusville, PA 16354. *How Calculators and Computers Compute.*

Any student who uses a computer or calculator should have a good understanding of how the machine actually computes the results. Such knowledge is necessary to guard against (and deal with) approximation errors, overflows, underflows, wrap-around infinities, and a host of related problems. It also shows that behind every button push is not “magic” but rather some clever mathematics and engineering. In this talk we shall look at methods of calculating elementary functions such as  $n$ th roots,  $\sin(x)$ ,  $\cos(x)$ ,  $\tan(x)$ ,  $\ln(x)$ , and exponential functions by methods such as CORDIC, polynomial approximations (such as minimax polynomials) and numerical algorithms. These methods will be illustrated by programs run on calculators and computers. The efficiency of such algorithms and the corresponding programs we use will be discussed. Such a calculational problem illustrates to computer science students the importance of efficient mathematical algorithms and illustrates to mathematics students the need for efficient programs in carrying out mathematical algorithms. (Received June 22, 2015)