1077-65-21   **Fred J Hickernell*** (`hickernell@iit.edu`), Room E1-208, Applied Mathematics, Illinois Institute of Technology, 10 W. 32nd Street, Chicago, IL 60616. *The Reliability of Error Estimates for Multivariate Numerical Integration.*

When solving a problem numerically one would like to obtain an approximate answer within a specified error tolerance of the true answer, and by expending a reasonable amount of effort. Standard error analyses bound the error of the algorithm in terms of some measure of the size of the input, e.g. some norm of the input function. The larger the size of the function, the more effort is needed. Unfortunately, the size of the function is typically not known a priori and must be estimated. Ones ability to estimate the function size depends on how nasty the function is. We present an example for multivariate numerical integration where this nastiness can be defined explicitly. Although any numerical algorithm can be fooled, our results mean that the desired accuracy can be guaranteed, provided that the integrand is not too nasty. (Received June 2, 2011)