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TWO METHODS FOR FINDING NUMERICAL BOUNDARY QUADRATURES OF MULTIVARIATE INTEGRATION

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There are many instances in which the value of an integral cannot be evaluated directly. We have to be satisfied with finding approximate values for these integrals by using numerical quadratures. The information about the function that we can use to form a numerical quadrature is often limited to points on the boundary of the integral domain. This project studies two methods of constructing a numerical quadrature of multivariate integration for the function values at nodes on the boundary of the integral domain.

The first method for obtaining a boundary quadrature for multivariate integration is the algebraic method. In this method we can construct a boundary quadrature with the highest possible algebraic accuracy degree and the fewest possible nodes of multivariate integration over some symmetric domain.

The second method that is used to construct a boundary quadrature is an analytic procedure. In this method we construct a boundary quadrature of the highest possible algebraic accuracy degree by using a lowering dimensionality expansion for multiple integrals over any domain with a piecewise smooth boundary. We are also able to give the best possible estimates for the remainders of the lowering dimensionality expansion.