

Finite Difference Formulas and Numerical Contour Integration in the Complex Plane

In many applications, function values are available only at equispaced grid points. In the case of analytic functions and grids in the complex plane, 2-D finite difference formulas become remarkably accurate already for very small stencil sizes. Their use in place of analytic derivatives in the Euler-Maclaurin formula results in highly effective computational methods for both contour integration and for numerical evaluation of fractional derivatives.