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Multidimensional polynomial iterations and Ismail's q -discriminants. Preliminary report.

Ismail defined a natural q -analogue of the discriminant and used it to produce elegant q -analogues of the classical formulas for the discriminants of Jacobi polynomials. These are recovered upon letting q tend to 1. We calculate the Ismailian q -analogue of the discriminant of the cubic $1 + a * x + b * x^2 + x^3$ and examine how it factors over the integers. The factorization of this polynomial in a , b , and q is intimately tied to a certain multidimensional polynomial iteration scheme that generalizes a classical one-dimensional quadratic map, namely an iteration taking x to $h*x^2 - k$. Asymptotic questions about the iteration lead to some specific real numbers we cannot yet identify in terms of standard constants. (Received January 27, 2009)