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Sam Northshield* (northssw@plattsburgh.edu). *Some iterative root-finding methods arising from matrices.*

Newton's method is generally convergent for quadratic polynomials; it converges rapidly to a root of $az^2 + bz + c$ for almost all starting points and almost all coefficients a, b, c . This can be understood in terms of an associative binary operation arising from 2×2 matrices. Here we develop an analogous theory based on $n \times n$ matrices. Newton's method is not generally convergent for cubic polynomials but McMullen found a one-variable algorithm that is (and showed that no such algorithm exists for higher degree polynomials). When $n = 3$, our method yields a two-variable generally convergent algorithm for cubics which, in certain cases, "contains" McMullen's algorithm. (Received June 20, 2011)