Abstract

In this paper we study how to accelerate the convergence of the ratios (x_n) of generalized Fibonacci sequences. In particular, we provide recurrent formulas in order to generate subsequences (x_{g_n}) for every linear recurrent sequence (g_n) of order 2. Using these formulas we prove that some approximation methods, as secant, Newton, Halley and Householder methods, can generate subsequences of (x_n). Moreover, interesting properties on Fibonacci numbers arise as an application. Finally, we apply all the results to the convergents of a particular continued fraction which represents quadratic irrationalities.