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A Matrix with Sums of Catalan Numbers – LU-Decomposition and Determinant,

Abstract

Following Benjamin, et al., a matrix with entries being sums of two neighboring Catalan numbers is considered. Its LU-decomposition is given, by guessing the results and later proving it by computer algebra, with lots of human help. Specializing a parameter, the determinant turns out to be a Fibonacci number with odd index, confirming earlier results, obtained back then by combinatorial methods.