

Lucas Atoms: a new definition and their p -adic valuations

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Abstract: In 2020, Sagan and Tirrell introduced Lucas atoms, which are irreducible factors of Lucas polynomials. The main aim of the authors was to investigate when some combinatorial rational functions are actually polynomials. In this joint work with Piotr Miska, Nadir Murru, and Giuliano Romeo, we introduce them in a more natural and powerful way than the original definition, providing straightforward proofs of their main properties. Moreover, we fully characterize the p -adic valuations of Lucas atoms for any prime p , answering a problem left open by Sagan and Tirrell. Finally, we prove that the sequence of Lucas atoms is not holonomic, in contrast to the Lucas sequence, that is a linear recurrent sequence of order two.