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Arithmetic Properties of a Gaussian Extension of a Special Fibonacci-Like Sequence

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Abstract

In this study, we investigate a Gaussian extension of a Fibonacci-like sequence defined by the nonstandard initial values (6,1). We derive closed formulas and Cassini-type identities for both the real sequence and its Gaussian extension. We also show that the norm sequence satisfies a distinct second-order linear recurrence. Using the norm and conjugation properties of $\mathbb{Z}[i]$, we establish divisibility criteria for (1+i) and norm divisibility by (5). These results demonstrate that nonstandard initial conditions produce additional arithmetic properties at the Gaussian level.

Keywords: Fibonacci-like sequences, Gaussian integers, Cassini identity.
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