Egyptian Fractions

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Short presentation of the research topic.

The aims of this article are to verify if we can always write a proper irreducible fraction $a/b$ as an egyptian fraction; to verify if there are different and eventually infinite possible expansions; to explore different ways to expand a proper fraction, comparing various methods in order to understand if there is a preferable one, depending on the results they lead to.

We studied Fibonacci’s method, Golomb’s method and a method based on practical numbers, retracing the original proofs, introducing new results and proposing some variants to the methods. Most importantly, we observed that through Fibonacci’s algorithm every proper fraction can be expanded into egyptian fractions, and the ways to do that are infinite in number.

We proposed a new original method based on a geometrical approach to the problem.

We studied the tree composed of the unitary fractions that expand a given proper fraction, designing a function that allows to determine the terms of the tree.