Generalized Solution of the Fibonacci Problem

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The work is devoted to the search and the expansion of knowledge about the complete solution of the historical problem called the "Fibonacci's Problem" (the XIIIth century), which was solved by the great mathematician only for the special case. The point is that you need to find the square of such a number X when you add the number P to it and subtract the number P from it, you get perfect squares. The aim of my research was to find a suitable method for the complete solution of the historical problem and its application for generality of the problem on arbitrary natural degrees of the numbers included in the condition. For this purpose, various methods for solving similar systems of equations were studied. As a result, a suitable method was found and successfully applied to obtain the complete solution to the original problem. In addition, it was possible to apply this method to generalize the problem to arbitrary natural degrees of the numbers included in the condition. The research also gave a positive answer to the question about the existence of a rational set of numbers satisfying the initial condition. The historical problem is completely solved and generalized. The exhaustive results of the study can set the example of the using the method of parametrization of Pythagorean triples for other algebraic systems that are similar in structure. In addition, they can find their application, for example, in the theory of encryption and coding to implement protection and obtain absolute security of any important information. It is known that there are many of unusual patterns between the squares of the Fibonacci’s numbers. Therefore, the idea has come up to continue the research on the manifestation in the resulting new class of numbers.

Awards Won:
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