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The Frobenius number for shifted geometric sequences associated with the number of solutions

By TAKAO KOMATSU (Nagasaki)

Abstract. For a non-negative integer p, one of the generalized Frobenius numbers, which is called the p-Frobenius number, is the largest integer that is represented at most in p ways as a linear combination with nonnegative integer coefficients of a given set of positive integers whose greatest common divisor is one. The famous so-called Frobenius number proposed by Frobenius is reduced to the 0-Frobenius number when $p = 0$. The explicit formula for the Frobenius number with two variables was found in the 19th century, but a formula with more than two variables is very difficult to find, and closed formulas of Frobenius numbers have been found only in special cases such as geometric, Thabit, Mersenne, and so on. The case of $p > 0$ was even more difficult, and not a single formula was known. However, most recently, we have finally succeeded in giving the p-Frobenius numbers as closed-form expressions of the triangular number triplet ([8]), repunits ([9]), Fibonacci triplet ([12]) and Jacobsthal triplet ([11]).

In this paper, we give closed-form expressions of the p-Frobenius number for the finite sequence $\{ab^n - c\}_n$, where a, b and c are integers with $a \geq 1$, $b \geq 2$ and $c \neq 0$. This sequence includes the cases for geometric, Thabit and Mersenne, as well as their variations.

TAKAO KOMATSU
FACULTY OF EDUCATION
NAGASAKI UNIVERSITY
NAGASAKI 852-8521
JAPAN

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