Compositeness Tests for Specific Classes of $k \cdot 3^n - 2$

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Abstract: Conjectured polynomial time compositeness tests for specific classes of numbers of the form $k \cdot 3^n - 2$ are introduced .
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1 Introduction

In 1969 Hans Riesel provided polynomial time primality test for numbers of the form $k \cdot 2^n - 1$ with k odd , $k < 2^n$ and $n > 2$, see Theorem 5 in [1] . In this note I present polynomial time compositeness tests for specific classes of numbers of the form $k \cdot 3^n - 2$.

2 The Main Result

Definition 2.1. Let $P_m(x) = 2^{-m} \cdot \left(\left(x - \sqrt{x^2-4}\right)^m + \left(x + \sqrt{x^2-4}\right)^m \right)$, where m and x are nonnegative integers .

Conjecture 2.1. *Let* $N = k \cdot 3^n - 2$ *such that* $n \equiv 0 \pmod{2}$, $n > 2$, $k \equiv 1 \pmod{4}$ *and* $k < 3^n$.

$$\text{Let } S_i = P_3(S_{i-1}) \text{ with } S_0 = P_{3k}(4) \text{ , thus}$$
$$\text{If } N \text{ is prime then } S_{n-1} \equiv P_1(4) \pmod{N}$$

Conjecture 2.2. *Let* $N = k \cdot 3^n - 2$ *such that* $n \equiv 1 \pmod{2}$, $n > 2$, $k \equiv 1 \pmod{4}$ *and* $k < 3^n$.

$$\text{Let } S_i = P_3(S_{i-1}) \text{ with } S_0 = P_{3k}(4) \text{ , thus}$$
$$\text{If } N \text{ is prime then } S_{n-1} \equiv P_3(4) \pmod{N}$$

References

[1] Riesel, Hans (1969) , "Lucasian Criteria for the Primality of $k \cdot 2^n - 1$" , *Mathematics of Computation* (AmericanMathematical Society), 23 (108): 869-875 .