Conjectured Compositeness Tests for Specific Classes of $k \cdot 10^n \pm c$

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Abstract: Conjectured polynomial time compositeness tests for numbers of the form $k \cdot 10^n - c$ and $k \cdot 10^n + c$ are introduced .
Keywords: Compositeness test , Polynomial time , Prime numbers .
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1 Introduction

In 2010 Pedro Berrizbeitia ,Florian Luca and Ray Melham provided polynomial time compositeness test for numbers of the form $(2^p + 1)/3$, see Theorem 2 in [1] . In this note I present polynomial time conpositeness tests for numbers of the form $k \cdot 10^n \pm c$ that are similar to the Berrizbeitia-Luca-Melham test .

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 $N = k \cdot 10^n - c$ such that $n > 2c$, $k > 0$, $c > 0$ and $c \equiv 3, 5 \pmod 8$*

$$\text{Let } S_i = P_{10}(S_{i-1}) \text{ with } S_0 = P_{5k}(P_5(6)) \text{ , thus}$$
$$\text{If } N \text{ is prime then } S_{n-1} \equiv -P_{5\lfloor c/2 \rceil}(6) \pmod N$$

Conjecture 2.2. *Let $N = k \cdot 10^n + c$ such that $n > 2c$, $k > 0$, $c > 0$ and $c \equiv 3, 5 \pmod 8$*

$$\text{Let } S_i = P_{10}(S_{i-1}) \text{ with } S_0 = P_{5k}(P_5(6)) \text{ , thus}$$
$$\text{If } N \text{ is prime then } S_{n-1} \equiv -P_{5\lceil c/2 \rceil}(6) \pmod N$$

Conjecture 2.3. *Let $N = k \cdot 10^n - c$ such that $n > 2c$, $k > 0$, $c > 0$ and $c \equiv 1, 7 \pmod 8$*

$$\text{Let } S_i = P_{10}(S_{i-1}) \text{ with } S_0 = P_{5k}(P_5(6)) \text{ , thus}$$
$$\text{If } N \text{ is prime then } S_{n-1} \equiv P_{5\lceil c/2 \rceil}(6) \pmod N$$

Conjecture 2.4. *Let* $N = k \cdot 10^n + c$ *such that* $n > 2c$ *,* $k > 0$ *,* $c > 0$ *and* $c \equiv 1, 7 \pmod 8$

Let $S_i = P_{10}(S_{i-1})$ *with* $S_0 = P_{5k}(P_5(6))$ *, thus*
If N *is prime then* $S_{n-1} \equiv P_{5\lfloor c/2 \rfloor}(6) \pmod N$

References

[1] Pedro Berrizbeitia ,Florian Luca ,Ray Melham , "On a Compositeness Test for $(2^p + 1)/3$", *Journal of Integer Sequences*,Vol. 13 (2010), Article 10.1.7 .