ON THE INTERSECTED SMARANDACHE PRODUCT SEQUENCES

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Abstract. In this paper we discuss a question concerning the intersected Smarandache product sequences.

Let $U=\{u_n\}_{n=1}^{\infty}$ be an infinite increasing sequence of positive integers. For any positive integer $n$, let

$$s_n = 1 + u_1 + u_2 + \cdots + u_n$$

Then the sequence $S(U) = \{s_n\}_{n=1}^{\infty}$ is called the Smarandache product sequence of $U$ (see [1]). Further, if there exist infinitely many terms in $U$ belonging to $S(U)$, then $S(U)$ is called intersected. In this paper we pose the following question:

Question. Which of ordinary Smarandache product sequences are intersected?

We now give some obvious examples as follows:

Example 1. If $U=\{n\}_{n=1}^{\infty}$, then $S(U)$ is intersected. In this case, we see from (1) that $s_n = u_1 + u_2 + \cdots + u_n$ for any positive integer $n$.

Example 2. Let $k$ be a positive integer with $k>1$. If $U=\{kn\}_{n=1}^{\infty}$, then $S(U)$ is non-intersected, since $k/s_n$ for any positive integer $n$.

Example 3. Let $k$ be a positive integer with $k>1$. If $U=\{n^k\}_{n=1}^{\infty}$, then $S(U)$ is non-intersected. In this case, we have $s_n = 1 + 2^k + \cdots + n^k = 1 + (n!)^k$, which is not a $k$-th power.

Example 4. If $U=\{n!\}_{n=1}^{\infty}$, then $S(U)$ is non-intersected. In this case, we have $s_n = 1 + 2! + \cdots + n!$, which is an odd integer if $n>1$. It implies that $u_n \in S(U)$ if and only if $n=2$.

Reference