# THE SMARANDACHE COMBINATORIAL SEQUENCES

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**Abstract:** Let $r$ be a positive integer with $r>1$, and let $SCS(r)$ denote the Smarandache combinatorial sequence of degree $r$. In this paper we prove that there has only the consecutive terms $1,2,\cdots,r$ of $SCS(r)$ are pairwise coprime.

**Key words:** Smarandache combinatorial sequences; consecutive terms; divisibility

Let $r$ be a positive integer with $r>1$. Let $SCS(r)=\{a(r,n)\}_{n=1}^{\infty}$ denote the Smarandache combinatorial sequence of degree $r$. Then we have

$$a(r,n)=n,\ n=1,2,\cdots,r \qquad (1)$$

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and $a(r,n)(n>r)$ is the sum of all the products of the previous terms of the sequence taking $r$ terms at a time. In [2], Murthy asked that how many of the consecutive terms of $SCS(r)$ are pairwise coprime. In this respect, Le [1] proved that $SCS(2)$ has only the consecutive terms 1,2 are pairwise coprime. In this paper we completely solve this problem as follows.

**Theorem.** For any positive integer $r$ with $r>1$, $SCS(r)$ has only the consecutive terms $1,2,\cdots,r$ are pairwise coprime.

**Proof.** By the define of $SCS(r)$, if $n \geq r$, then we have

$$a(r,n)=\sum a(r,n_1)a(r,n_2)\cdots a(r,n_r), \tag{2}$$

where $(n_1,n_2,\cdots,n_r)$ through over all integers such that $1 \leq n_1 < n_2 < \cdots < n_r \leq n$. Hence, by (2), we get the recurrence

$$a(r,n+1)=a(r,n)a(r-1,n-1)+a(r,n). \tag{3}$$

Therefore, we find from (3) that if $n \geq r$, then

$$a(r,n+1) \equiv 0 . \pmod{a(r,n)}. \tag{4}$$

It implies that $SCS(r)$ has no consecutive terms after $a(r,r)$ are pairwise coprime. Thus, by(1), the theorem is proved.

## References


[1] M. –H. Le, The divisibility of the Smarandache combinatorial sequence of degree two, to appear.

[2] A. Murthy, Some new Smarandache sequences, functions and partitions, Smarandache Notions J. 11(2000), 179-183.