On Numbers That Are Pseudo-Smarandache And Smarandache Perfect

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In a paper that is scheduled to be published in volume 31(3) of **Journal of Recreational Mathematics**, entitled "On A Generalization of Perfect Numbers"[1], Joseph L. Pe defines a generalization of the definition of perfect numbers. The standard definition is that a number n is perfect if it is the sum of its' proper divisors.

$$n = \sum_{i=1}^{k} d_i$$

Pe expands this by applying a function to the divisors. Therefore, a number n is said to be **f-perfect** if

$$n = \sum_{i=1}^{k} f(d_i)$$

for f an arithmetical function.

The Pseudo-Smarandache function is defined in the following way:

For any integer $n \geq 1$, the value of the Pseudo-Smarandache function Z(n) is the smallest integer m such that $1 + 2 + 3 + \ldots + m$ is evenly divisible by n.

This function was examined in detail in [2].

The purpose of this paper is to report on a search for numbers that are Pseudo-Smarandache and Smarandache perfect.

A computer program was written to search for numbers that are Pseudo-Smarandache perfect. It was run up through 1,000,000 and the following three Pseudo-Smarandache perfect numbers were found.

n = 4	factors 1, 2
n = 6	factors 1, 2, 3
n = 471544	factors 1, 2, 4, 8, 58943, 117886, 235772

This leads to several additional questions:

a) Are there any other Pseudo-Smarandache perfect numbers?
b) If the answer to part (a) is true, are there any that are odd?
c) Is there any significance to the fact that the first three nontrivial factors of the only large number are powers of two?

The Smarandache function is defined in the following way:

For any integer $n > 0$, the value of the Smarandache function $S(n)$ is the smallest integer m such that n evenly divides m factorial.

A program was also written to search for numbers that are Smarandache perfect. It was run up through 1,000,000 and only one solution was found.

n = 12   factors - 1, 2, 3, 4, 6

This also leads to some additional questions:

d) Are there any other Smarandache perfect numbers?
e) If the answer to part (a) is true, are there any that are odd?
f) Is there any significance to the fact that n has the first three nontrivial integers as factors?

References

1. Joseph L. Pe, "On a Generalization of Perfect Numbers", **Journal of Recreational Mathematics**, 31(3) to appear.

2. Kenichiro Kashihara, **Comments and Topics on Smarandache Notions and Problems**, Erhus University Press, 1996.