ON THE 17-th SMARANDACHE'S PROBLEM

Krassimir T. Atanassov

CLBME - Bulg. Academy of Sci., and MRL, P.O.Box 12, Sofia-1113, Bulgaria,

e-mail: krat@bgcict.acad.bg

krat@argo.bas.bg

The 17-th problem from [1] (see also 22-nd problem from [2]) is the following:

17. Smarandache's digital products:

$$\underbrace{0,1,2,3,4,5,6,7,8,9},\underbrace{0,1,2,3,4,5,6,7,8,9},\underbrace{0,2,4,6,8,19,12,14,16,18},$$

$$\underbrace{0,3,6,9,12,15,18,21,24,27},\underbrace{0,4,8,12,16,20,24,28,32,36},\underbrace{0,5,10,15,20,25...}$$

($d_p(n)$ is the product of digits.)

Let the fixed natural number n have the form $n = \overline{a_1a_2...a_k}$, where $a_1, a_2, ..., a_k \in \{0, 1, ..., 9\}$ and $a_1 \geq 1$. Therefore,

$$n = \sum_{i=1}^{k} a_i 10^{i-1}.$$

Hence, $k = [\log_{10} n] + 1$ and

$$a_1(n) \equiv a_1 = [\frac{n}{10^{k-1}}],$$

$$a_2(n) \equiv a_2 = [\frac{n - a_1 10^{k-1}}{10^{k-2}}],$$

$$a_3(n) \equiv a_3 = [\frac{n - a_1 10^{k-1} - a_2 10^{k-2}}{10^{k-3}}],$$

$$\cdots$$

$$a_{[\log_{10} n]}(n) \equiv a_{k-1} = [\frac{n - a_1 10^{k-1} - ... - a_{k-2} 10^2}{10}],$$

$$a_{[\log_{10} n]+1}(n) \equiv a_k = n - a_1 10^{k-1} - ... - a_{k-1} 10.$$

Obviously, $k, a_1, a_2, ..., a_k$ are functions only of n. Therefore,

$$d_p(n) = \prod_{i=1}^{[\log_{10} n]+1} a_i(n).$$

REFERENCES:

[1] C. Dumitrescu, V. Seleacu, Some Sotions and Questions in Number Theory, Erhus Univ. Press, Glendale, 1994.

[2] F. Smarandache, Only Problems, Not Solutions!. Xiquan Publ. House, Chicago, 1993.