



planetmath.org

Math for the people, by the people.

generalized Smarandache palindrome

Canonical name	GeneralizedSmarandachePalindrome
Date of creation	2013-03-22 17:03:25
Last modified on	2013-03-22 17:03:25
Owner	dankomed (17058)
Last modified by	dankomed (17058)
Numerical id	7
Author	dankomed (17058)
Entry type	Definition
Classification	msc 11Z05
Related topic	FlorentinSmarandache

A *generalized Smarandache palindrome* (GSP) is a concatenated number of the form: $a_1a_2 \dots a_na_n \dots a_2a_1$, for $n \geq 1$, or $a_1a_2 \dots a_{n-1}a_na_{n-1} \dots a_2a_1$, for $n \geq 2$, where all a_1, a_2, \dots, a_n are positive integers of various number of digits in a given base b .

Proposed Problem

Find the number of GSP of four digits that are not palindromic numbers in base 10.

M. Khoshnevisan, Griffith University, Gold Coast, Queensland 9726, Australia.

Solution

Before solving the problem, let see some examples:

1) 1235656312 is a GSP because we can group it as (12)(3)(56)(56)(3)(12), i.e. ABCCBA.

2) The number 5675 is also a GSP because it can be written as (5)(67)(5).

3) Obviously, any palindromic number is a GSP number as well.

A palindromic number of four digits has the concatenated form: $abba$, where $a \in \{1, 2, \dots, 9\}$ and $b \in \{0, 1, 2, \dots, 9\}$. There are $9 \times 10 = 90$ palindromic numbers of four digits. For example, 1551, or 2002 are palindromic (and, of course, GSP too); yet 3753 is not palindromic but it is a GSP for $3753=3(75)3$, i.e. of the form ABA; similarly 4646, for it can be organized as $(46)(46)$, i.e. of the form CC. Therefore, a SGP, different from a palindromic number, should have the concatenated forms: 1) ABA, where $A \in \{1, 2, \dots, 9\}$ and $B \in \{00, 01, 02, 03, \dots, 99\} - \{00, 11, 22, 33, \dots, 99\}$; 2) or CC, where $C \in \{10, 11, 12, \dots, 99\} - \{11, 22, 33, \dots, 99\}$. In the first case, one has $9 \times (100 - 10) = 9 \times 90 = 810$. In the second case, one has $90 - 9 = 81$. Total: $810 + 81 = 891$ GSP numbers of four digits which are not palindromic.

References

1. Charles Ashbacher, Lori Neirynck, www.gallup.unm.edu/smarandache/GeneralizedPalindromes, Density of Generalized Smarandache Palindromes, Journal of Recreational Mathematics, Vol. 33 (2), 2006
2. G. Gregory, <http://www.gallup.unm.edu/smarandache/GSP.htm> Generalized Smarandache Palindromes
3. M. Khoshnevisan, "Generalized Smarandache Palindrome", Mathematics Magazine, Aurora, Canada, 10/2003.
4. M. Khoshnevisan, Proposed Problem #1062 (on Generalized Smarandache Palindrome), The IIME Epsilon, USA, Vol. 11, No. 9, p. 501, Fall 2003.

5. Mark Evans, Mike Pinter, Carl Libis, Solutions to Problem #1062 (on Generalized Smarandache Palindrome), The IIME Epsilon, Vol. 12, No. 1, 54-55, Fall 2004.

6. N. Sloane, <http://www.research.att.com/cgi-bin/access.cgi/as/njas/sequences/eis> of Integers, Sequence A082461

7. F. Smarandache, <http://www.gallup.unm.edu/~smarandache/Sequences-book.pdf> Sequences of Numbers Involved in Unsolved Problems, Hexis, 1990, 2006