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Magic Squares

every third in the remaining list, every fourth number in what remains after that, every fifth number remaining after that and so on. The set of numbers that remains after this infinite sequence is performed are the Lucky numbers.

1, 3, 7, 9, 13, 15, 21, 25, 31, 33, 37, 43, 49, 51, 63, ...

A number is said to be a member of the lucky-digital subsequence if the digits can be partitioned into two number mn in that order such that $L_m = n$.

37 and 49 are both elements of this sequence. How many others are there?

Study this type of sequence for other well-known sequences.

References


Magic Squares

For $n \geq 2$, let $A$ be set of $n^2$ elements and $I$ an $n$-ary relation defined on $A$. As a generalization of the XVIth-XVIIth century magic squares, we present the magic square of order $n$. This is square array of elements of $A$ arranged so that $I$ applied to all rows and columns yields the same result.

If $A$ is an arithmetic progression and $I$ addition, then many such magic squares are known. The following appeared in Durer's 1514 engraving, "Melancholia"

$$
\begin{array}{cccc}
16 & 3 & 2 & 13 \\
5 & 10 & 11 & 8 \\
9 & 6 & 7 & 12 \\
4 & 15 & 14 & 1 \\
\end{array}
$$

Questions:

1) Can you find magic square of order at least three or four where $A$ is a set of prime numbers and $I$ is addition?
2) Same question when \(A\) is a set of square, cube or other spatial numbers such as the Fibonacci, Lucas, triangular or Smarandache quotients. Given any \(m\), the Smarandache Quotient \(q(m)\) is the smallest number \(k\) such that \(mk\) is a factorial.

A similar definition for the magic cube of order \(n\), where the elements of \(A\) are arranged in the form of a cube of length \(n\).

3) Study questions similar to those above for the cube. An interesting law may be

\[
l(a_1, a_2, \ldots, a_n) = a_1 + a_2 - a_3 + a_4 - a_5 \ldots
\]

References

[1] F. Smarandache, "Properties of the Numbers", University of Craiova Archives, 1975. [See also the Arizona State Special Collections, Tempe, AZ, USA].