The sum of the digits of a number

Primality testing

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Abstract :

In this paper, I will try to explain my idea about the world of the digits of numbers which is somewhat circumvented by mathematicians.

Introduction:

Through some research I've done, I noticed that the field of digits is considered by many as the sights of calculation. So; in my study I will concentrate the light on some corners of the world of digits that I think are unexplored especially on the sum of the digits of a number.

Sum of the digits of a number:

$\sum 21 = 3$ $\sum 71 = 8$

In my study; the sum of the digits of a number is recursive reduction of the sum of digits of a number

Exple:

$\sum 39 = \sum 12 = 3$

$\sum 259328 = \sum 29 = \sum 11 = 2$

After several checks; I noticed that the recursive reduction of the digits of a number belongs to the set .

S={1,2,3,4,5,6,7,8,9}

Here is the evolution of the multiple of numbers according to the recursive sum of their digits:

Table I:

m \ s	1	2	3	4	5	6	7	8	9
S	1	2	3	4	5	6	7	8	9
2S	2	4	6	8	1	3	5	7	9
3S	3	6	9	3	6	9	3	6	9
4S	4	8	3	7	2	6	1	5	9
5S	5	1	6	2	7	3	8	4	9
6S	6	3	9	6	3	9	6	3	9
7S	7	5	3	1	8	6	4	2	9
8S	8	7	6	5	4	3	2	1	9
9S	9	9	9	9	9	9	9	9	9

m : Multiple

s: sum of the digits of even a number

NB:

$1=\sum19=\sum28=\sum37=\sum46=\sum55$………………..

$2=\sum11=\sum20=\sum29=\sum38=\sum47$………………..

$3=\sum12=\sum21=\sum30=\sum39=\sum48$………………..

$4=\sum13=\sum22=\sum31=\sum40=\sum49$………………..

$5=\sum14=\sum23=\sum32=\sum41=\sum50$………………..

$6=\sum15=\sum24=\sum33=\sum42=\sum51$………………..

$7=\sum16=\sum25=\sum34=\sum43=\sum52$………………..

$8=\sum17=\sum26=\sum35=\sum44=\sum53$………………..

$9=\sum18=\sum27=\sum36=\sum45=\sum54$………………..

In other hand ; in the sum of the digits of a number it seems that with “multiplication,division,addition and subtraction” the result is stored on both sides of equality in the set of natural integers.

Exples:

1/ addition:

$25+31=56$

$\sum25+\sum31=\sum56=7+4=11$

$\sum11=2=\sum56$

2/ sustraction

48-19=29

∑48-∑19=∑12-∑10=3-1=2

∑29=∑11=2

3/multiplication:

17X24=408

∑17X∑24=8X6=48

∑48=∑12=3

∑408=∑12=3

4/division:

- 84/12=7 ∑84=∑21

SO ∑84/∑12=21/3=7

- 35/12=2 remainder=11 SO 35≡11[12]

∑35/∑12=8/3=2 remainder=2

∑11=2

Neutral element and absorber:

Exple:

- ∑385219=∑38521=∑19=1

9+8=17 ∑17=8

5+9=14 ∑14=5

So the neutral element in the sum of the digits of a number is 9

- 9X1=9
  9X2=18 ∑18=9
  9X3=27 ∑27=9
  :::::::::::::
  :::::::::::::
  For the multiple of 9 , the role of 9 is the absorber

Primality testing:

In the set of primes we can use also the sum of the digits of a number in order to verify their primality.

So even a number; **when the recursive sum of its digits is equal to 3,6 or 9 the number is not prime**

In this way, we do a sieve of natural integers ,so after eliminating those kind of numbers, the numbers which stay and susceptible to be prime are in the form:

30 n +7 in position 4 → P4
30 n +11 in position 5 → P5
30 n +11 in position 6 → P6
30 n +17 in position 7 → P7
30 n +19 in position 8 → P8
30 n +23 in position 9 → P9
30 n +29 in position 10 → P10
30 n +31 in position 11 → P11