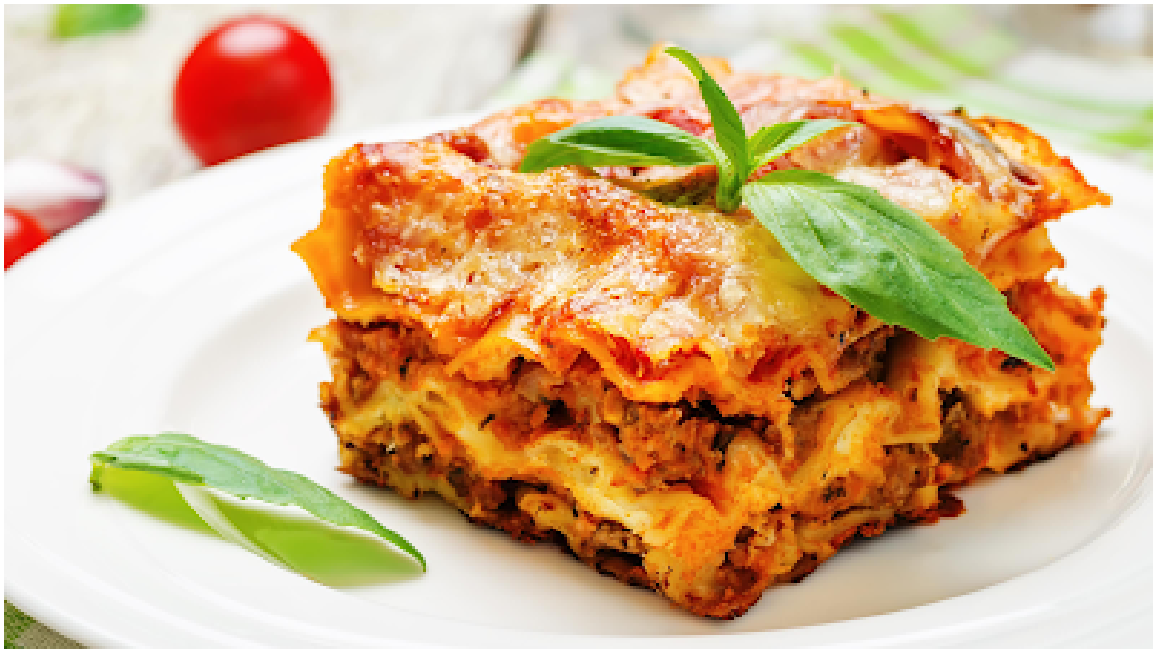
Fibostracci

septembre 30, 2022



(*Stracci* is a kind of lasagna – see here: "Al plur., *stracci*, tipo di pasta fatta in casa, tagliata in forma di lasagne di cui è anche simile l'impasto, rammorbidito però con un po' di latte o di olio; è in uso spec. in Liguria e nel Piemonte".)

We start S with a(1) = 0 and a(2) = 1.
As 0 and 1 share no digit we add them and extend S with the sum:

S = 0, 1, **1**, ...

As the last two integers share at least one digit, we don't add them and extend S instead with the smallest integer not yet in S:

S = 0, 1, 1, **2**, ...

As 1 and 2 share no digit, we add them and extend S with the sum:

S = 0, 1, 1, 2, **3**, ...

As 2 and 3 share no digit, we add them and extend S with the sum:

S = 0, 1, 1, 2, 3, **5**, ...

Then:

S = 0, 1, 1, 2, 3, 5, **8, 13, 21**, ...

As the last two integers share at least one digit, we don't add them and extend S instead with the smallest integer not yet in S:

S = 0, 1, 1, 2, 3, 5, 8, 13, 21, **4**, ...

Then:

S = 0, 1, 1, 2, 3, 5, 8, 13, 21, 4, **25, 29**, ...

As 25 and 29 share the digit 2, we get:

S = 0, 1, 1, 2, 3, 5, 8, 13, 21, 4, 25, 29, **6**, ...

Then:

S = 0, 1, 1, 2, 3, 5, 8, 13, 21, 4, 25, 29, 6, **35, 41, 76, 117**, ...

As 76 and 117 share the digit 7, we get:

S = 0, 1, 1, 2, 3, 5, 8, 13, 21, 4, 25, 29, 6, 35, 41, 76, 117, **7**, ...

As 117 and 7 share the digit 7, we get:

S = 0, 1, 1, 2, 3, 5, 8, 13, 21, 4, 25, 29, 6, 35, 41, 76, 117, 7, **9**, ...

Then:

S = 0, 1, 1, 2, 3, 5, 8, 13, 21, 4, 25, 29, 6, 35, 41, 76, 117, 7, 9, 16, 25, 41, 66, 107, 173, ...

Etc.

I guess we quickly have (if I'm not wrong):

S = 0, 1, 1, **2**, 3, 5, 8, 13, 21, **4**, 25, 29, **6**, 35, 41, 76, 117, **7**, **9**, 16, 25, 41, 66, 107, 173, **10, 11, 12, 14, 15, 17, 18, 19, 20**, 39, 59, **22**, 81, 103, **23, 24, 26, 27, 28, 30**, 58, 88, **31**, 119, 150, ...

Question:

Will the proportion red integers/blue integers increase for ever – or stabilize at some point?

[the blue integers are the sums a(n-1) + a(n), the red integers are not (except the first 2)].

Best,

É.

MFH *8 décembre 2022 à 12:44*

Yes. On one hand, almost all numbers have all digits 0-9 (only 0% of all numbers don't have all digits! Remember that all but a finite number of numbers have only < 10^10^k digits, for any k...) But even much earlier, the red numbers outnumber the blue ones: up to n = 1000, we have less than 60 blue numbers (there are only 5 between n=300 and n=500 and 7 more up to n=1000), up to n = 10^4, there are only about 15 more blue numbers.

RÉPONDRE

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