Cinquante signes

Revenant numbers

octobre 19, 2019

Take an integer *abc...z* and multiply it by all its digits: if the string *abc...z* appears in the result, we have a "revenant number".

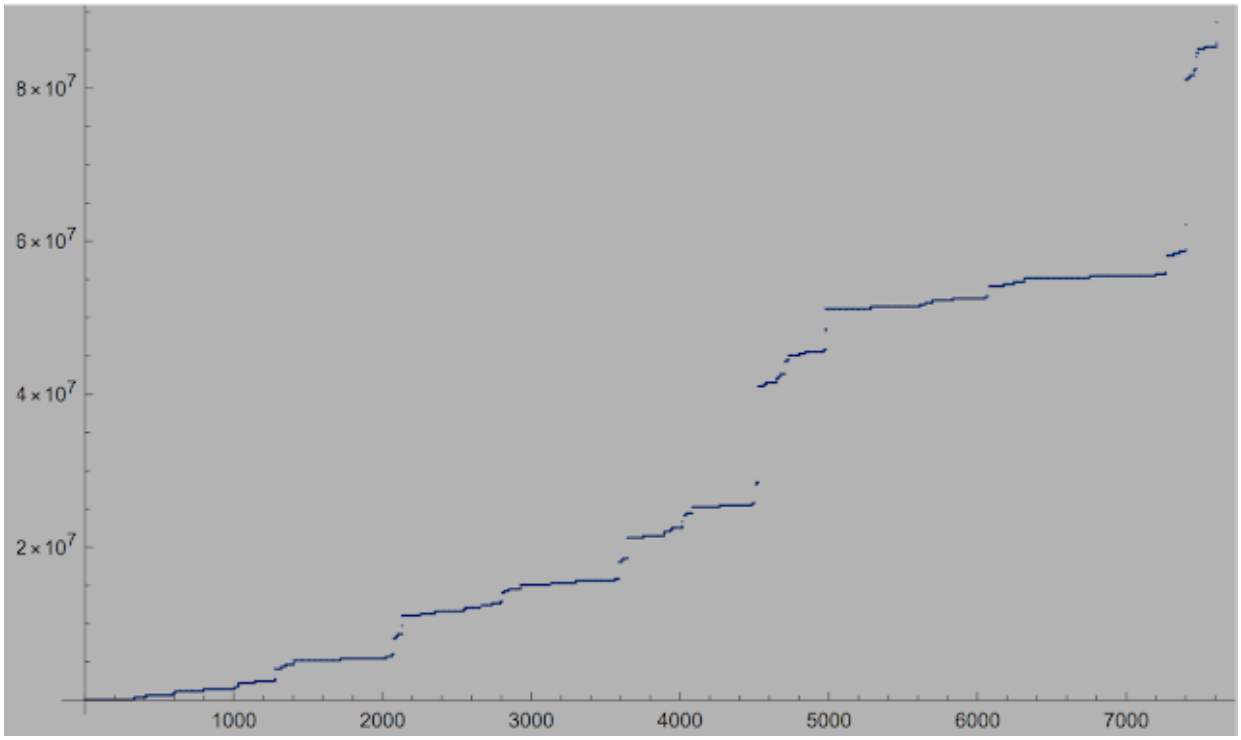
Look at 87 for instance: **87** * 8 * 7 = 4872. As the string 87 is visible in the result, 87 is a *revenant*.
The same with 792 because **792** * 7 * 9 * 2 = 99792.

And with 9375 as **9375** * 9 * 3 * 7 * 5 = 8859375.

If we start a sequence **R** of such *revenants* we get:

R = 0, 1, 5, 6, 11, 25, 52, 77, 87, 111, 125, 152, 215, 251, 375, 376, 455, 512, 521, 545, 554, 736, 792, 1111, 1125, 1152, 1215, 1251, 1455, 1512, 1521, 1545, 1554, 2115, 2151, 2174, 2255, 2511, 2525, 2552, 4155, 4515, 4551, 5112, 5121, 5145, 5154, 5211, 5225, 5252, 5415, 5451, 5514, 5522, 5541, 5558, 5585, 5855, 8555, 8772, 9375, ...

R is infinite, of course, as all *repunits* (like 11, 111, 1111, 1111,...) will be in **R**.



Jean-Marc Falcoz has computed all *revenants* < 100 000 000 (they are 7607) and a few interesting things appear:

*Digit-frequency in **R*** {digit followed by its quantity in the *revenants* < 100 000 000}:

{**0**,1},{**1**,16100},{**2**,9283},{**3**,5},{**4**,4800},{**5**,25434},{**6**,6},{7,12},{**8**,2191},{**9**,5}.

[There are only 4 *revenants* < 100 000 000 showing at least a 9: {792, 9375, 9859155, 62227496} and there are only 5 such *revenants* with a 3: {375, 376, 736, 9375, 23255814}.]

Revenants < 100 000 000 whose "image" doesn't include one or more zeros {revenant followed by its image}:

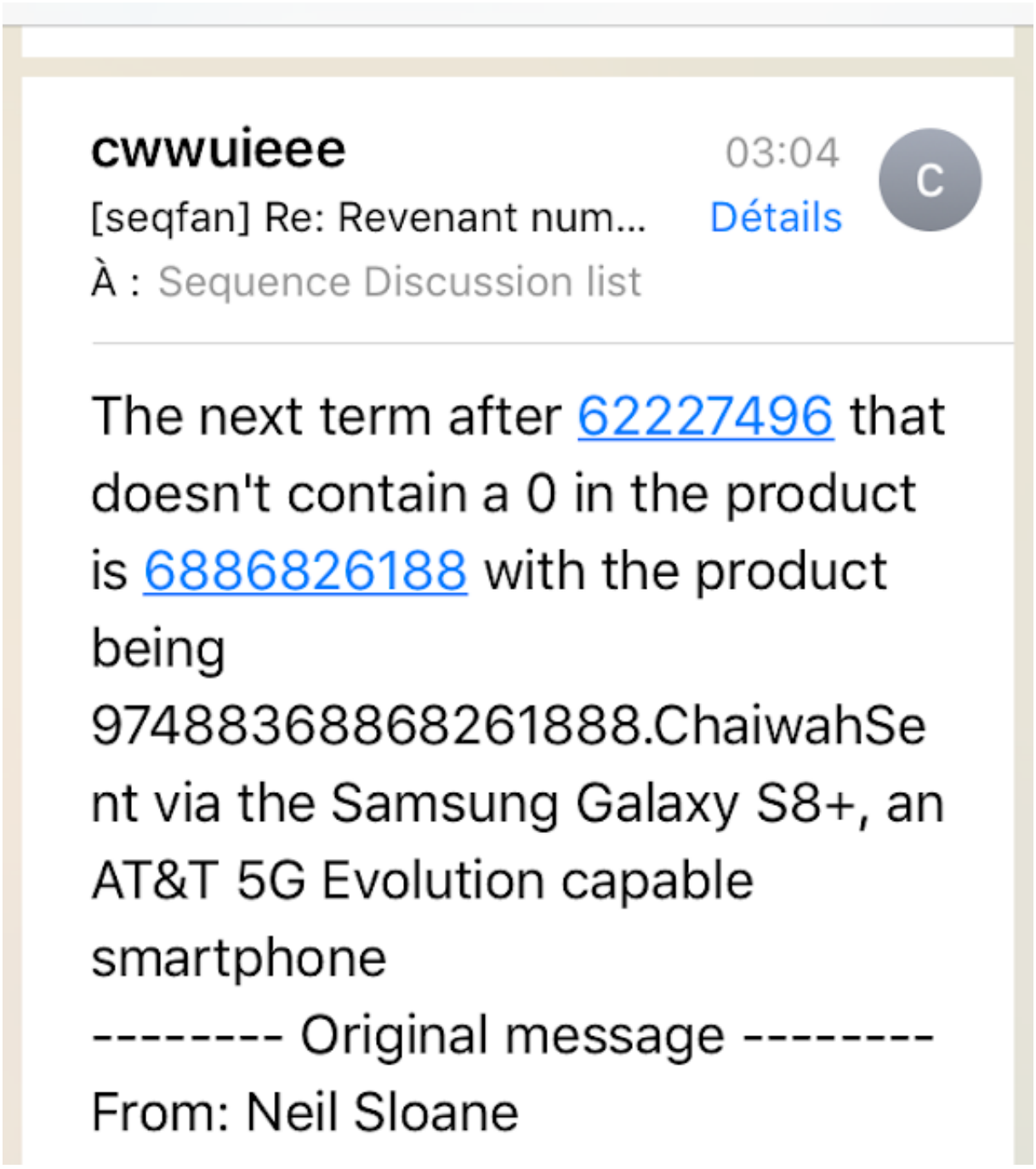
{1,1},{5,25},{6,36},{11,11}, {77,3773},{87,4872},{111,111},{375,39375},{376,47376},{736, 92736},{792,99792},{1111,1111},{2174,121744},{8772,6877248},{9375,8859375}, {11111,11111},{11628,1116288},{111111,111111},{1111111,1111111},{11111111, 11111111}, {62227496, 4516222749696}.

[The *revenant* in yellow is a gem: will someone find a bigger such one?]

The last ten *revenants* < 100 000 000 are:
85555514, 85555522, 85555541, 85555558, 85555585, 85555855, 85558555, 85585555, 85855555, 88555555.

Do you see a pattern there?-)
Best,
É.
(the sequence is now in the OEIS – and has inspired this one)

Update (october 21st, 2019)
Chai Wah Wu (yesterday): « The next term after 62227496 that doesn't contain a 0 in the product is **6886826188** with the product being 974883**68868261888** ».
Bravo **Chai Wah** and many thanks!



... Mais le "product" cité par **Chai Wah** peut très bien comporter un zéro interne ! **Jean-Marc** m'envoya d'ailleurs ceci (qui vient avant le terme de Chai Wah) :

> Après 24h non stop de pêche au gros, j'ai fini par en ferrer un :o)
> 3'691'262'781 qui donne 80**3691262781**568
> À première vue, un nombre de cette taille à environ une chance sur 2 milliards de

marcher...

Nombre que confirma **Hans Haverman** sur le forum *SeqFans* :

>> **CWW**: "The next term after 62227496 that doesn't contain a 0 in the product is 6886826188 with the product being 97488368868261888."

Hans Haverman:
> When Eric suggested that his "gems" subsequence have images/products not containing any zeros, I thought he was being unduly restrictive. Ignoring products whose *final digit* is zero reproduces his list and catches additional gems such as 3691262781 -> 80**3691262781**568.

Update again, (october 24th 2019):
Giovanni Resta has sent this message to the *SeqFans* list:

> I added 3 further terms to the sequence: 517322161894, 774773248793 and 2675959368829.

517322161894 * 725760 = 3754**517322161894**40
774773248793 * 348509952 = 270016187**747732487**936
2675959368829 * 3527193600 = 94386**26759593688294**400

Still searching, but no other up to 2.5*10^12.
...

Merci, thanks to all and bravo!
É.

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Posts les plus consultés de ce blog

A square for three (chess)

juin 22, 2024

(English translation after the French text) Voici cinq problèmes d'échecs disjoints : a) combien faut-il de coups au minimum pour que trois pions soient capturés sur la même case ? b) trois tours c) trois c ...

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Le tripalin se présente

avril 11, 2024

Un tripalin est constitué de trois images. Chaque image illustre un substantif. Accolés, ces trois substantifs forment une chaîne palindromique. Laquelle nous vous invitons à trouver. Exem ...

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Some strings au cinéma Galeries

juillet 19, 2024

Lettre ouverte au cinéma Galeries Bonsoir à tous, Je viens de voir pour la seconde fois chez vous le beau film de Léos Carax (la première fois c'était le 26 juin en présence du réalisateur, au BRIFF). Apparut à l'écran aujourd'hui, avant la projection propre ...

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