

a(n) is the digitsum of a(a(n))

Hello SeqFans,

Seq starts:

S = 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 29, 13, 49, 15, 69, 17, 89, 19, 199, 21, 399, 23, 599, 25, 799, 27, 999, 30, 2999, 3999, 32, 5999, 34, ...

How many 9's in the 999th term?

;-)

[always take the smallest a(n) not yet present in S and not leading to a contradiction]

Best,

E.

A short explanation:

'4' is in S because '4' says: "The digitsum of the term in 4th position in S is equal to 4" - which is true

'11' is in S because '11' says: "The digitsum of the term in 11th position in S is equal to 11" - which is true [the 11th term of S is '29' and the digitsum of 29 is 11 --> (2+9)]

'10' is NOT in S because '10' would have said: "The digitsum of the term in 10th position in S is equal to 10" - which would be UNTRUE [as the 10th term of S would then have been '10' itself with digitsum 1 --> (1+0)]

'29' is in S because no other term less than 29 would fit there; as mentioned above, if we want to prolong S we must "always take the smallest a(n) not yet present in S and not leading to a contradiction". The 29th term of S is 2999 with digitsum 29 --> (2+9+9+9) ... etc.

Maximilian Hasler was quick to answer:

> How many 9's in the 999th term?

111, of course: 999 = 111 x 9!
(and a(998) = 1000).

S = 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 29, 13, 49, 15, 69, 17, 89, 19, 199, 21, 399, 23, 599, 25, 799, 27, 999, 30, 2999, 3999, 32, 5999, 34, 7999, 36, 9999, 38, 29999, 40, 49999, 42, 69999, 44, 89999, 46, 199999, 48, 399999, 499999, 51, 699999, 53, 899999, 55, 1999999, 57, 3999999, 59, 5999999, 61, 7999999, 63, 9999999, 65, 29999999, 67, 49999999, 70, 69999999, 79999999, 72, 99999999, 74, 299999999, 76, 499999999, 78, 699999999, 80, 899999999, 82, 1999999999, 84, 3999999999, 86, 5999999999, 88, 7999999999, 8999999999, 91, 19999999999, 93, 39999999999, 95, 59999999999, 97, 79999999999, 99, 99999999999, 101, 299999999999, 103, 499999999999, 105, 699999999999, 107, 899999999999, 109, 1999999999999, 111, 3999999999999, 113, 5999999999999, 115, 7999999999999, 117, 9999999999999, 119, 29999999999999, 121, 49999999999999, 123, 69999999999999, 125, 89999999999999, 127, 199999999999999, 129, 399999999999999, 131, 599999999999999, 133, 799999999999999, 135, 999999999999999, 137, 2999999999999999, 139, 4999999999999999, 141, 6999999999999999, 143, 8999999999999999, 145, 19999999999999999, 147, 39999999999999999, 149, 59999999999999999, 151, 79999999999999999, 153, 99999999999999999, 155, 299999999999999999, 157, 499999999999999999, 159, 699999999999999999, 161, 899999999999999999, 163, 1999999999999999999, 165, 3999999999999999999, 167, 5999999999999999999, 169, 7999999999999999999, 171, 9999999999999999999, 173, 29999999999999999999, 175, 49999999999999999999, 177, 69999999999999999999, 179, 89999999999999999999, 181, 199999999999999999999, 183, 399999999999999999999, 185, 599999999999999999999, 187, 799999999999999999999, 189, 999999999999999999999, 191, 2999999999999999999999, 193, 4999999999999999999999, 195, 6999999999999999999999, 197, 8999999999999999999999, 200, 9999999999999999999999, 2999999999999999999999, 202, ...
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Integers not present in S are (I think):

10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 31, 33, 35, 37, 39, 41, 43, 45, 47, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 71, 73, 75, 77, 79, 81, 83, 85, 87, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124, 126, 128, 130, 132, 134, 136, 138, 140, 142, 144, 146, 148, 150, 152, 154, 156, 158, 160, 162, 164, 166, 168, 170, 172, 174, 176, 178, 180, 182, 184, 186, 188, 190, 192, 194, 196, 198, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391, 393, 395, 397, 400, 402, 404, 406, 408, 410, 412, 414, 416, 418, 420, 422, 424, 426, 428, 430, 432, 434, 436, 438, 440, 442, 444, 446, 448, 450, 452, 454, 456, 458, 460, 462, 464, 466, 468, 470, 472, 474, 476, 478, 480, 482, 484, 486, 488, 490, 492, 494, 496, 498, 500, 502, 504, 506, 508, 510,

512, 514, 516, 518, 520, 522, 524, 526, 528, 530, 532, 534, 536, 538, 540, 542, 544, 546, 548, 550,
552, 554, 556, 558, 560, 562, 564, 566, 568, 570, 572, 574, 576, 578, 580, 582, 584, 586, 588, 590,
592, 594, 596, 598, 601, 603, 605, 607, 609, 611, 613, 615, 617, 619, 621, 623, 625, 627, 629, 631,
633, 635, 637, 639, 641, 643, 645, 647, 649, 651, 653, 655, 657, 659, 661, 663, 665, 667, 669, 671,
673, 675, 677, 679, 681, 683, 685, 687, 689, 691, 693, 695, 697, 699, 701, 703, 705, 707, 709, 711,
713, 715, 717, 719, 721, 723, 725, 727, 729, 731, 733, 735, 737, 739, 741, 743, 745, 747, 749, 751,
753, 755, 757, 759, 761, 763, 765, 767, 769, 771, 773, 775, 777, 779, 781, 783, 785, 787, 789, 791,
793, 795, 797, 800, 802, 804, 806, 808, 810, 812, 814, 816, 818, 820, 822, 824, 826, 828, 830, 832,
834, 836, 838, 840, 842, 844, 846, 848, 850, 852, 854, 856, 858, 860, 862, 864, 866, 868, 870, 872,
874, 876, 878, 880, 882, 884, 886, 888, 890, 892, 894, 896, 898, 900, 902, 904, 906, 908, 910, 912,
914, 916, 918, 920, 922, 924, 926, 928, 930, 932, 934, 936, 938, 940, 942, 944, 946, 948, 950, 952,
954, 956, 958, 960, 962, 964, 966, 968, 970, 972, 974, 976, 978, 980, 982, 984, 986, 988, 990, 992,
994, 996, 998, ...
(This is now [A167153](#))

Many thanks, **Maximilian!**