Perfect primes (hard version) P43557_en

The statement of this exercise is identical to that of exercise . But here the solution required is more efficient in general.

Given a natural number n, let $s(n)$ be the sum of the digits of n. In this exercise, we say that n is a perfect prime if the infinite sequence n, $s(n)$, $s(s(n))$, ... only contains prime numbers. For instance, 977 is a perfect prime, because 977, $9 + 7 + 7 = 23$, $2 + 3 = 5$, 5, ..., are all prime numbers.

Write a recursive function that tells if a natural number n is a perfect prime or not.

Interface

C++	**bool** *is_perfect_prime* (**int** n);
C	**int** *is_perfect_prime* (**int** n);
Java	**public static boolean** *isPerfectPrime*(**int** n);
Python	*is_perfect_prime* (n) # returns bool
	is_perfect_prime (n: *int*) $\rightarrow$ *bool*

Precondition

We have $n \geq 0$.

Observation

You only need to submit the required procedure; your main program will be ignored.

Problem information

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