
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 $n, s(n), s(s(n)), \dots$ only contains prime numbers. For instance, 977 is a perfect prime, because $977, 9 + 7 + 7 = 23, 2 + 3 = 5, 5, \dots$, are all prime numbers.

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

Interface

C++	bool <i>is_perfect_prime</i> (int n);
C	int <i>is_perfect_prime</i> (int n);
Java	public static boolean <i>isPerfectPrime</i> (int n);
Python	<i>is_perfect_prime</i> (n) # returns bool <i>is_perfect_prime</i> (n : <i>int</i>) \rightarrow <i>bool</i>

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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