

Project Euler #719: Number Splitting

Solved December 2, 2021

We define an S -number to be a natural number, n , that is a perfect square and its square root can be obtained by splitting the decimal representation of n into two or more numbers then adding the numbers.

For example, 81 is an S -number because $\sqrt{81} = 8 + 1$.

6724 is an S -number: $\sqrt{6724} = 6 + 72 + 4$.

8281 is an S -number: $\sqrt{8281} = 82 + 8 + 1$.

9801 is an S -number: $\sqrt{9801} = 98 + 0 + 1$.

Further we define $T(N)$ to be the sum of all S numbers $n \leq N$. You are given $T(10^4) = 41333$.

Find $T(10^{12})$.

Solution

```
• N = 10^12;
```

g (generic function with 1 method)

```
• function g(n, s)
•     n ≤ s && return n == s
•     for i in 1:ndigits(n)-1
•         g(n % 10^i, s - n ÷ 10^i) && return true
•     end
•     return false
• end
```

T (generic function with 1 method)

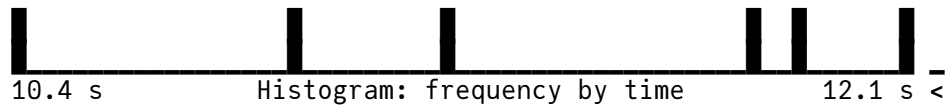
```
• T(N) = sum(n^2 for n in 2:isqrt(N) if g(n^2, n))
```

128088830547982

```
• T(10^12)
```

BenchmarkTools.Trial: 6 samples with 1 evaluation.

Range (min ... max):	10.401 s ... 12.052 s	GC (min ... max):	0.00% ... 0.00%
Time (median):	11.486 s	GC (median):	0.00%
Time (mean \pm σ):	11.365 s \pm 636.055 ms	GC (mean \pm σ):	0.00% \pm 0.00%



Memory estimate: 0 bytes, allocs estimate: 0.

Validation

- @assert I(10^4) == 41333