The ThreeKPlusOne Package

Version 42

Dummy Authör

Dummy Authör Email: 3kplusone@dev.null

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You can do with this package what you want.

Really.

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Chapter 1

The $3k+1$ Problem

1.1 Theory

Let $k \in \mathbb{N}$ be a natural number. We consider the sequence $n(i,k), i \in \mathbb{N}$, with $n(1,k) = k$ and else $n(i+1,k) = n(i,k)/2$ if $n(i,k)$ is even and $n(i+1,k) = 3n(i,k)+1$ if $n(i,k)$ is odd.

It is not known whether for any natural number $k \in \mathbb{N}$ there is an $m \in \mathbb{N}$ with $n(m,k) = 1$.

ThreeKPlusOne provides the function `ThreeKPlusOneSequence` (1.2.1) to explore this for given n. If you really want to know something about this problem, see [Wir98] or this homepage for more details (and forget this package).

1.2 Program

In this section we describe the main function of this package.

1.2.1 ThreeKPlusOneSequence

▷ `ThreeKPlusOneSequence(k[, max])` (function)

This function computes for a natural number `k` the beginning of the sequence $n(i,k)$ defined in section 1.1. The sequence stops at the first 1 or at $n(\texttt{max},k)$, if `max` is given.

Example

```
gap> ThreeKPlusOneSequence(101);
"Sorry, not yet implemented. Wait for Version 84 of the package"
```

References

[Wir98] Günther J. Wirsching. *The dynamical system generated by the* $3n+1$ *function*, volume 1681 of *Lecture Notes in Mathematics*. Springer-Verlag, Berlin, 1998. doi:10.1007/BFb0095985. 4

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