An Investigation into Mapping Decimal Expansions into Simple Expressions

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Abstract

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Our first approach is to develop what we call the "integer spectra", which are perhaps the simplest possible generation rules. These rules generate expressions of definite length, counted as one for each symbol use.

Define E_n to be the set of all expressions of precisely length n.

The generating rules are:

- "1" is a zero-ary symbol.
- $(!k)$ is a unary symbol operating on a expression k.
- $(+kj)$ is a binary operation on k and j where j is less than k, by the ordering of the size of the expression first and then the value if the sizes are the same.
- $(*kj)$ is similar.
- $(**kj)$ is has the value k^j.
- $-k$ is a unary operation.

(This of course could be thought of as a grammar.) From this grammar, a straigforward algorithm generates E_n with all smaller classes as input.

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