Puzzle Update

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$$a \;;\; (b \;;\; c)^5$$

zip

$$(x \;;\; y)^5 \;;\; z$$

=

$$ax \;;\; (by \;;\; cx)^4 \;;\; by \;;\; cz$$

$$(p \;;\; q)^k \;=\; p \;;\; (q \;;\; p)^{k-1} \;;\; q$$

$$(a\ ;\ b)^{6}$$

zip

$$(x\ ;\ y\ ;\ z)^{4}$$

=

$$((a\ ;\ b)^{3}\ \textbf{zip}\ (x\ ;\ y\ ;\ z)^{2})^{2}$$

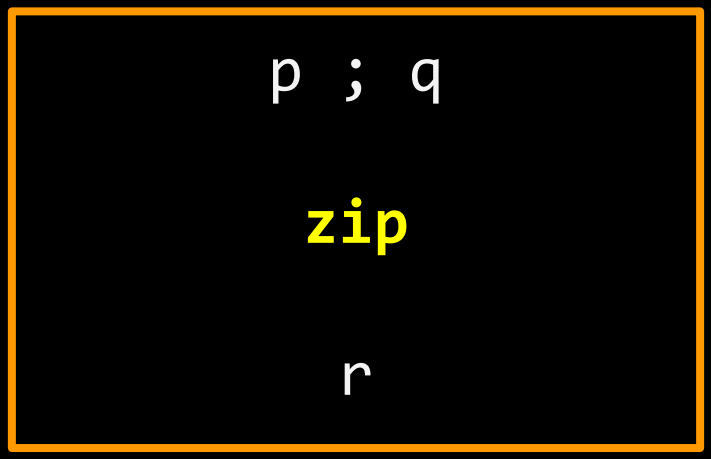
p^3 **zip** q^2

=

$(p^3$ **zip** $(q$; $q))$

$((p$; $p^2)$ **zip** $q^2)$

$((p^2$; $p)$ **zip** $q^2)$



=

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(p zip take k r) ; (q zip drop k r)
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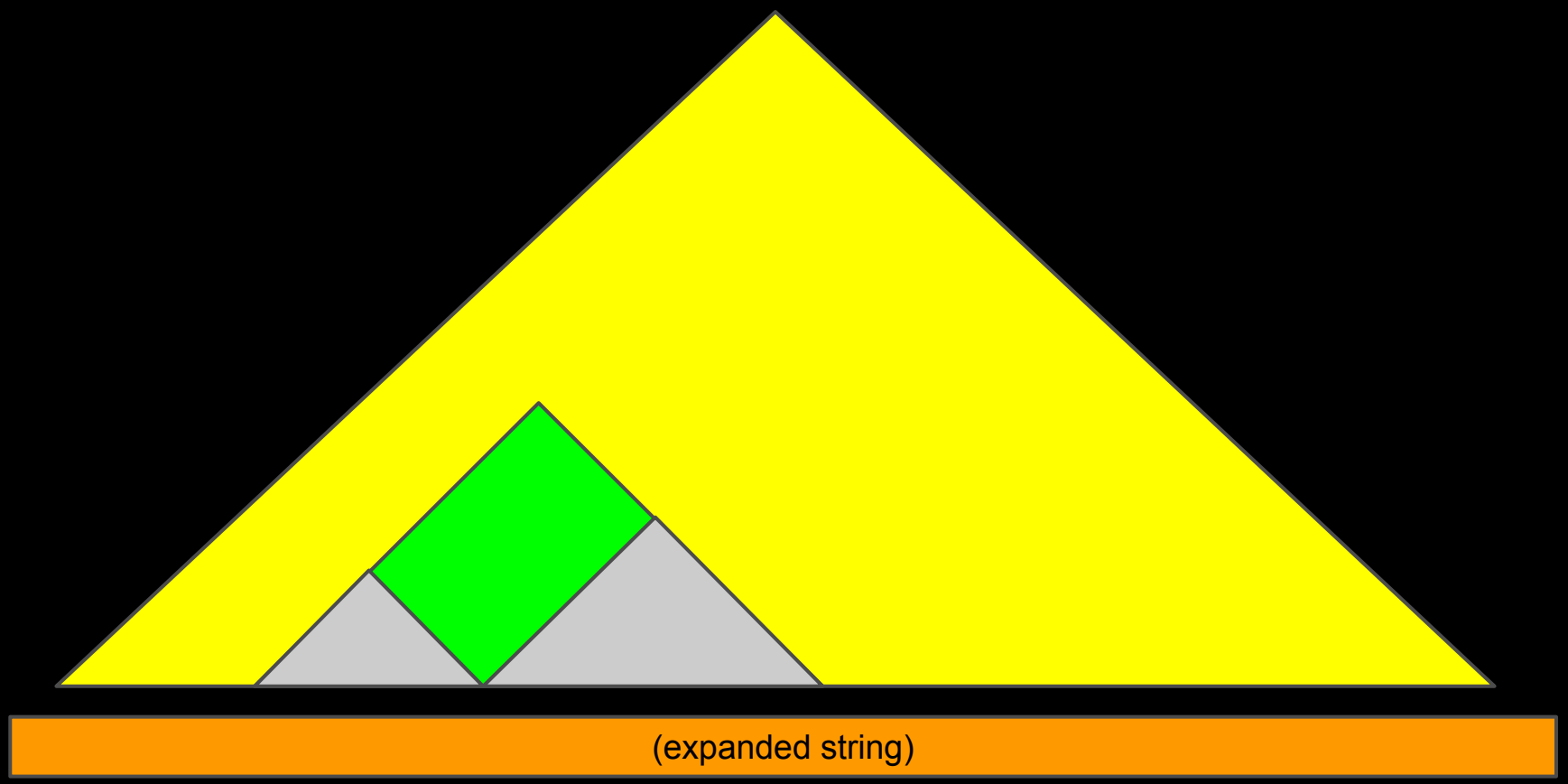
take k (r^n)

=

r^a ; take b r

take b r ; (drop b r ; take b r)^a



QuickCheck properties

$a \; ; \; b^6 \; ; \; c^2$

zip

$(x \; ; \; y \; ; \; z)^3$

=

ax; by; bz; bx; by; bz; bx; cy; cz

$ax \; ; \; (by \; ; \; bz \; ; \; bx)^2 \; ; \; cy \; ; \; cz$

Ideas

- Use Brzozowski-style derivatives -> state machines
- Generalizing the compressing method to expressions
- Show that it is NP-hard
- Show that you can factor numbers with it

Repetitions in strings: algorithms and combinatorics

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Abstract

The article is an overview of basic issues related to repetitions in strings, concentrating on algorithmic and combinatorial aspects. This area is important both from theoretical and practical point of view. Repetitions are highly periodic factors (substrings) in strings and are related to periodicities, regularities, and compression. The repetitive structure of strings leads to higher compression rates, and conversely, some compression techniques are at the core of fast algorithms for detecting repetitions. There are several types of repetitions in strings: squares, cubes, and maximal repetitions also called runs. For these repetitions, we distinguish between the factors (sometimes qualified as distinct) and their occurrences (also called positioned factors). The combinatorics of repetitions is a very intricate area, full of open problems. For example we know that the number of (distinct) primitively-rooted squares in a string of length n is no more than $2n - \Theta(\log n)$, conjecture to be n, and that their number of occurrences can be $\Theta(n \log n)$. Similarly we know that there are at most