

Word Equations: Sheet 4

LZ77 on this list is non self-referencing.

Task 1 Suppose that S is a length-minimal solution of a word equation $u = v$. Let w be a substring of $S(u)$. Show that w has an occurrence that overlaps with some cut.

Hint: Using the inductive definition of the transitive closure may be helpful.

Task 2 Consider a greedy construction of an LZ77 decomposition, in which the next fragment f_i is the longest possible substring of $f_1 f_2 \cdots f_{i-1}$. Show that the size of such obtained LZ77 is smallest possible.

Task 3 Consider a word w and let ℓ and z be the sizes of smallest SLP and LZ77 for it. Show that $\ell \geq z$. In fact, you do not need to assume that SLP is in Chomsky normal form.

Task 4 Show that the composition system of size n can be turned into an SLP of polynomial size. How small you can make the polynomial?