Star exercises - series II
Languages, automata and computations II

6. Two dimensional VASS

Show that in every two dimensional Vector Addition System with States, which is structurally bounded (i.e. reachability set from every configuration is finite) and set of states is strongly connected the size of the reachability set from a configuration $q(x, y)$ is polynomial w.r.t. x, y, number of states n and the biggest absolute value occurring in transitions M.

7. Universality of deterministic VASS

Define language of a labelled Vector Addition System with States in a natural way: it is a set of labelings of paths, which start in a given *initial configuration* and end in any configuration with a given *final state* (notice that we accept by state, not by a configuration). Show that it is decidable for a deterministic VASS with transitions labelled by letters of Σ whether its language is universal, i.e. equal Σ^*.

8. Register automata with homomorphisms

Letter-to-letter homomorphism is a homomorphism, which maps every letter to a single letter, $h(a) = b$, $h(b) = a$, $h(c) = c$. Show that equivalence of two register automata (as introduced on the lecture) with additional operation of letter-to-letter homomorphisms is decidable.