

Exercise Sheet 14

Problem 1: Parikh Images

Show the following: If the Parikh images of a full trio \mathcal{C} are effectively semilinear, then the simultaneous unboundedness problem is decidable for \mathcal{C} .

Problem 2: \mathcal{C} -Grammars

- Show how the algorithm for eliminating ε -productions can be applied to \mathcal{C} -grammars. Assume emptiness is decidable for \mathcal{C} and that \mathcal{C} is a full trio..
- Show that emptiness is decidable for a full trio \mathcal{C} if and only if emptiness is decidable for $\text{Alg}(\mathcal{C})$.

Problem 3: Petri net languages

- Show that for a full trio \mathcal{C} , $\text{Alg}(\mathcal{C})$ is closed under Kleene iteration.
- Show that for the full trio of Petri net languages \mathcal{P} , it holds $\mathcal{P} \subsetneq \text{Alg}(\mathcal{P})$.

Problem 4: Algebraic Extensions

- Show that if \mathcal{C} is a full trio then so is $\text{Alg}(\mathcal{C})$.
[Hint: Use Problem 2 on Sheet 12 and for regular intersections, apply the triple construction.]
- Show that if emptiness is decidable for a full trio \mathcal{C} , then $\text{Alg}(\mathcal{C})$ is not closed under intersection.
[Hint: Use 2b) and the fact that $(D'_1 \#_1)^*$ is context-free.]