" Analysis and Verification (185.276, VU 2.0, ECTS 3.0) "   SS 2019
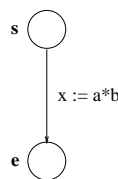
Assignment 7   29 May 2019

Exercise 1 : (5*2+5+10 Points)

Consider the sign analysis over the set of DFA informations $\mathcal{C}_{sa} = \{\bot, 0, -, +, +/-\}$ of Assignment 6 with the local abstract semantics

$$[\![\ ]\!]_{sa} : E \to (\Sigma_{\mathcal{C}_{sa}} \to \Sigma_{\mathcal{C}_{sa}})$$

and program G:

1. What are the 'weakest preconditions' (for a and b) at **s** for the DFA query "$x \vdash_{\mathbf{e}} c$?" at **e** for the 5 possible choices of c with respect to the reverse semantics $[\![\ ]\!]_{sa_R}$ induced by $[\![\ ]\!]_{sa}$?

2. Are these preconditions expressive n the sense of allowing conclusions on the constant propagation problem at **e**? Which ones? Which ones not? Why?

3. Can you specify a distributive sign analysis? What preconditions are delivered by this analysis?

Exercise 2 : (5+5 Points)

For distributive DFA functionals $[\![\ \cdot\ ]\!]$ we have the following relationships: (cf. Link Theorem 8.9.1.1) / Zusammenhangstheorem 8.9.1.1) :
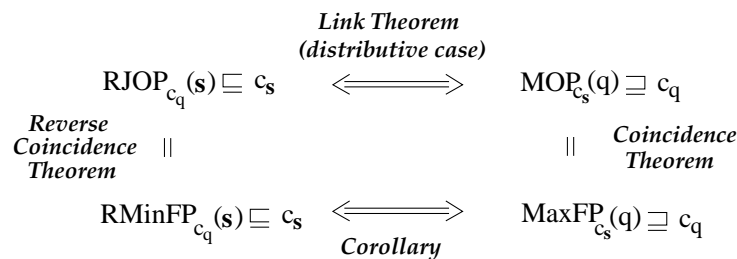
2.1 How does the above figure change for monotonic but not distributive DFA functionals?

2.2 What conclusions allow the *RJOP* and *RMinFP* solution of the reverse DFA problem to be drawn on the underlying DFA problem, if this one is monotonic but not distributive?

Submission: Wednesday, 5 June 2019, before the lecture.