Ninth exercise sheet for the lecture

The Algebraic Path Problem

Prof. Dr. Heiko Vogler / Dr. Janis Voigtländer

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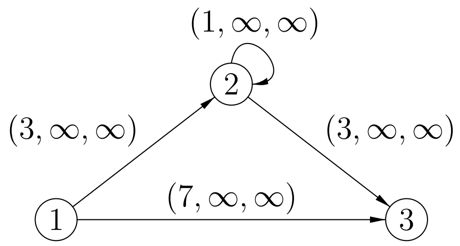
Exercise 30 (*k*-best paths, Mahr algorithm)
Consider the following $Trop_3$-weighted graph:



Execute the Mahr algorithm. $\diamond$

Exercise 31 (Mahr algorithm)
Prove that the Mahr algorithm solves the algebraic path problem.

(Hint: Use the fact, proved in the lecture, that the Gauss-Jordan algorithm solves the algebraic path problem.) $\diamond$

Exercise 32 (an auxiliary statement)
Discuss whether it is true that $(a+1)^* = a^*$ for every element a of a complete and idempotent semiring. $\diamond$

Exercise 33 (Aho algorithm)
Prove that the Aho algorithm solves the algebraic path problem for (infinitary) idempotent semirings.

(Hint: Use the fact, proved in Exercise 31, that the Mahr algorithm solves the algebraic path problem.) $\diamond$