Tutorial 6

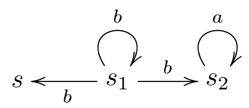
Exercise 1*

Consider the set $\{a, b, c\}$ (with three elements). Define some nontrivial function $f : 2^{\{a,b,c\}} \to 2^{\{a,b,c\}}$ which is monotonic.

- Compute the greatest fixed point of f by using directly the Tarski's fixed point theorem.
- Compute the least fixed point of f by starting from $\emptyset$ and applying repeatedly the function f until the fixed point is reached.

Exercise 2

Consider the following labelled transition system.

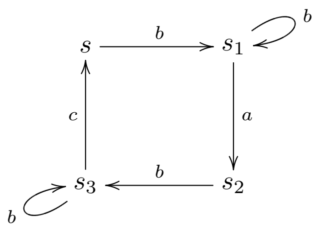


Compute for which sets of states $[\![X]\!] \subseteq \{s, s_1, s_2\}$ the following formulae are true.

- $X = \langle a \rangle tt \vee [b]X$
- $X = \langle a \rangle tt \vee ([b]X \wedge \langle b \rangle tt)$

Exercise 3*

Consider the following labelled transition system.



Using the game characterization for recursive Hennessy-Milner formulae decide whether the following claims are true or false and discuss what properties the formulae describe:

- $s \overset{?}{\models} X$ where $X \overset{\min}{=} \langle c \rangle tt \vee \langle Act \rangle X$
- $s \overset{?}{\models} X$ where $X \overset{\min}{=} \langle c \rangle tt \vee [Act]X$
- $s \overset{?}{\models} X$ where $X \overset{\max}{=} \langle b \rangle X$
- $s \overset{?}{\models} X$ where $X \overset{\max}{=} \langle b \rangle tt \wedge [a]X \wedge [b]X$