Mathematical Structures in Formal Methods, *MSFM*
Handout for Lecture 6 (2018/6/7)

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1 Today's Lecture

Theory of order-theoretic fixed points. Its relationship to LTL semantics. Go back to [Vardi, Section 2.5, 2.6], on alternating automata and games.

2 Report Assignment

2.1 Logistics

- Due: the beginning of the next lecture
- Hand in a hard copy, or submit electronically
  - To: `i.hasuo [at] acm.org` *and* `soichi [at] is.s.u-tokyo.ac.jp` (Soichiro Fujii, TA).
  - Title: "MSFM Report Assignment" (we filter messages)
- Put your name in your pdf (we print them)

2.2 Problems

CANCELED. No assignments this week.

1. (About alternating automata on finite words) Consider the following alternating automaton:

$$\big(\,\{a,b\},\{s_0,s_1,s_2,s_3\},s_0,\rho,\{s_0,s_1\}\,\big)$$

   where the transition function ρ is given by the following.

$$\begin{aligned} &\rho(s_0,a)=s_0 && \rho(s_0,b)=s_0\wedge s_1\\ &\rho(s_1,a)=s_2 && \rho(s_1,b)=\text{true}\\ &\rho(s_2,a)=s_1 && \rho(s_2,b)=s_2\vee s_3\\ &\rho(s_3,a)=s_3 && \rho(s_3,b)=\text{false} \end{aligned}$$

   Present a run that witnesses that the word *abbaabaa* is accepted.

2. Follow the construction of Theorem 22 in [Vardi] and translate a formula $G(p\supset Fq)$ into an alternating Büchi automaton.