1 Today's Lecture

Closure properties of Buechi automata. Impossibility of determinization. Complementation via Rabin automata. We use [Vardi, Section 2].

Report Assignment

1. Give a formal proof for the first half of the proof of Proposition 9 (that it suffices to prove the claim for Rabin conditions that consist of a single pair).

2. Given a language $L' \subseteq A^*$, we define an ω-language $\overrightarrow{L'} \subseteq A^\omega$ by

$$\overrightarrow{L'} := \{w \in A^\omega \mid w\text{'s infinitely many prefixes are in } L'\} .$$

   (Note that L' is a set of *finite* words; $\overrightarrow{L'}$ is a set of *infinite* words.)

   (a) Show that if $L \subseteq A^\omega$ is recognized by some *deterministic* Büchi automaton, there exists a regular language $L' \subseteq A^*$ such that $L = \overrightarrow{L'}$. (Note that you must show both $L \subseteq \overrightarrow{L'}$ and $L \supseteq \overrightarrow{L'}$)

   (b) Use (a) to show that $(0+1)^*1^\omega$ is not recognized by any deterministic Büchi automaton.

   (c) Conclude that deterministic Büchi automata have an expressive power that is strictly less than (general) Büchi automata.

   (d) Prove the converse of (a).