

CS154 Assignment 5

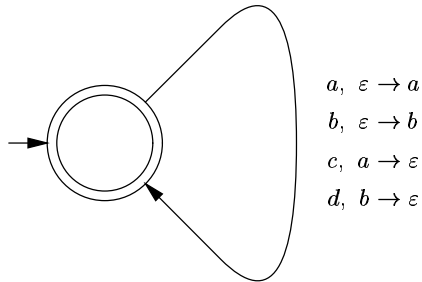
February 9, 2001

The homework should be done without collaboration!

Please submit every problem on a separate sheet.

Assignment due: 02/14/2001 at 3:15pm.

1. Do the two homework problems in the handout on decidability.
2. Give an implementation-level description of a Turing machine recognizing the language $\{0^n 1^n 2^n \mid n \geq 0\}$.
3. (This problem may be skipped by CS154N students)
Convert the following PDA to a CFG (generating the same language):



4. A 2-PDA is a pushdown automaton with two stacks. It has a transition function

$$\delta : Q \times \Sigma_\varepsilon \times \Gamma_\varepsilon \times \Gamma_\varepsilon \rightarrow \mathcal{P}(Q \times \Gamma_\varepsilon \times \Gamma_\varepsilon)$$

Describe (somewhat informally) why 2-PDAs are just as powerful as Turing machines.

Hint: Show that 2 stacks can simulate a tape.

Extra credit problem (optional): Call a language *definable* if there is any piece of text that describes exactly which words are in the language and which are not. Derive a contradiction (thereby showing that the concept of definability above is not well-defined).