CpSc 3500 — Goddard

Warmup 3: Context-Free Languages

1. State whether each of the following is true or false. No justification required.

   (a) There exists a language accepted by a DFA but by no PDA.

   (b) There exists a language accepted by a nondeterministic FA but by no deterministic PDA.

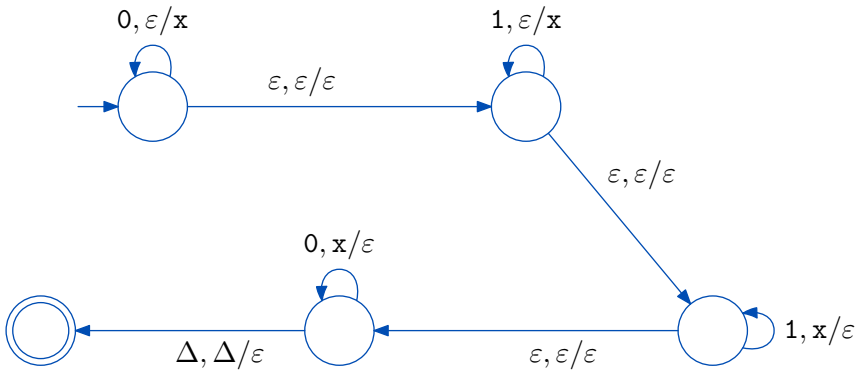
   (c) The context-free language are closed under the three Kleene operations.

2. Give a regular grammar for the language generated by the RE $(\mathtt{x}+\mathtt{y})^*(\mathtt{xyy}+\mathtt{yx})$

3. Show that the context-free languages are closed under reversal. That is, show algorithmically that if language L is context-free, then so is L^R, where L^R consists of the reverses of all strings in L.

4. Let X be the set of all binary strings that are odd-length palindromes or all of whose symbols are the same. (For example, `01110` and `1111` are in X.) Draw a PDA for X.

5. Consider following PDA.



   (a) Give two strings of length 4 accepted by the PDA.

   (b) Give two strings of length 4 NOT accepted by the PDA.

   (c) Describe in succinct-ish English the language of this PDA. Be precise.