CS 420 Spring 2019 Homework 2

Due February 13

- 1. Let $L = \{w \in \{0,1\}^* | w \text{ contains exactly one 1 and an even number of 0's}\}$. Starting with DFAs for two simpler languages, use the intersection construction to give a DFA that recognizes L.
- 2. (a) Give an NFA with four states that recognizes $L_1 = \{w \in \{0,1\}^* | w \text{ contains 011 as a substring }\}$. [You can give a DFA with four states that recognizes L_1 , but you should use nondeterminism to give an NFA that is simpler than the DFA.]
 - (b) Give an NFA with two states and only one accept state that recognizes the language $L_2 = 0^* 1^* \cup 0^* 21^*$.
- 3. Convert the NFA given on page 91 of the slides into a DFA. Show only the reachable states of the DFA.
- 4. Let $L = \{11, 110\}^*$.
 - (a) Give an NFA N with four states that recognizes L. Your NFA should be similar to the NFA we gave in class to recognize $\{01, 010\}^*$.
 - (b) Using the method from class, convert N to a DFA M.
 - (c) How does M compare with the DFA given in the solutions to Exercise 1c of Homework 1?
- 5. Using the method from class, give an NFA that recognizes $L_1 \cup L_2$, where L_1 and L_2 are the languages from Exercise 2.
- 6. Using the method from class, give an NFA that recognizes $L_1 \circ L_2$, where L_1 and L_2 are the languages from Exercise 2.
- 7. Using the method from class, give an NFA that recognizes L_2^* , where L_2 is the language from Exercise 2.