**Problem Set 2**

CSc 350, Fall 2019

Assigned: Wednesday, Week 3

Due: Wednesday, Week 4

Department of Computer Science

Union College

**Related Reading**

Read sections 1.1, 1.2, and 1.3 of [1].

1. **Constructing DFAs from NFAs.** Do problem 1.16, part a, from Sipser [1], p. 86.

2. **Proving that a language is regular.** Let \( B_n = \{ a^k \mid k \text{ is a multiple of } n \} \). Show that for each \( n \geq 1 \), the language is regular.

   So, you have to prove that \( B_1, B_2, B_3, \text{ etc.} \) are all regular. How do you prove that a language is regular? Remember the definition of regular languages. Regular languages are exactly those languages that can be recognized by finite state automata.

3. **Specifying regular expressions.**
   (a) Sipser [1], p. 87, no. 1.22

4. **Specifying more regular expressions.** Give regular expressions generating the following languages.

   In all parts the alphabet is \( \{0, 1\} \).
   (a) \( \{ w \mid w \text{ contains at least three } 1s \} \)
   (b) \( \{ w \mid w \text{ has length of at least 3 and its third symbol is a } 0 \} \)
   (c) \( \{ w \mid \text{ every odd position of } w \text{ is a } 1 \} \)
   (d) \( \{ w \mid w \text{ is any string except } 11 \text{ and } 111 \} \)

**References**


**Honor Code Affirmation**

*I affirm that I have carried out my academic endeavors with full academic honesty.*