CSC236 Week 11 Tutorial:

Regular Expressions and DFAs

Slides Credit: Charlene Chu

Preliminary

For each of the following languages, give a regular expression that matches the language. You should also give some explanation (not a formal proof) that your regular expression is correct.

1. $L = \{w \in \{0,1\}^* \mid w \text{ starts with 01 but does not end with 01}\}$
2. $M = \{w \in \{0,1\}^* \mid \text{the fifth symbol from the right of } w \text{ is a 1}\}$

Give a 5-state DFA that accepts $L = \{w \in \{0,1\}^* \mid \text{the third symbol of } w \text{ is 1}\}$

Exercise 1

Consider the language over $\Sigma = \{0, 1\}$ defined as $\{w \mid w \text{ has an odd number of 1's}\}$.

Design a DFA accepting this language.
Then, state and prove state invariants for your DFA.

Exercise 2

For each of the following languages over $\Sigma = \{0, 1\}$, design a DFA that accepts the language and prove that the DFA is correct.

1. All strings that begin with 011 (i.e., prefix 011).
2. All strings whose third letter is 1.
3. All strings that, when interpreted as a binary number, are even.
4. All strings that contain 011 (i.e., substring 011).
5. All strings that do not contain 011.