Recitation 2 (9/15/17)

Minimal DFAs

Let

$$A_5 = \{w \mid \#1\text{'s in } w \text{ is divisible by } 5\}$$

Show that any DFA that accepts A_5 requires at least 5 states.

Closure properties for Regular Languages

via construction of DFAs

We have seen examples of this type such as closure under

- union
- concatenation
- star
- complement

via Regular Expressions

Show that if L is a regular language, so is $L^{\mathcal{R}}$, that is, given a regular expression that describes L, describe how to construct a regular expression that describes $L^{\mathcal{R}}$.

via Closure Properties

1. Show that if A and B are regular languages, so is $A \cap B$.

2. Suppose A is a regular language, B is a non-regular language and $C = \{c_1, \ldots, c_{100}\}$ is a set of 100 binary strings. Which of the following languages is/are regular and why? (i) $A \cup C$ (ii) $A \setminus C$ (iii) $B \cup C$ (iv) $B \setminus C$

3. Suppose A is a non-regular language and $B \subseteq A$. Is B non-regular? Why/why not?

4. Suppose A and B are non-regular languages. Is $A \cap B$ non-regular? Why/why not?

Non-regularity

Show that the language

$$L = \{0^i 1^j : i \geq j \geq 0\}$$

is a non-regular language.