Recitation 2 (9/15/17)

Minimal DFAs

Let

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

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 $L^R$, that is, given a regular expression that describes $L$, describe how to construct a regular expression that describes $L^R$. 

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

\[ L = \{0^i1^j : i \geq j \geq 0\} \]

is a non-regular language.