

Maths for Computing

Tutorial 13

- Construct the DFAs for the following languages over $\{0,1\}$:
 - $L = \{w \mid w \text{ contains at least two 1s}\}$.
 - $L = \{w \mid \text{for every prefix } x \text{ of } w, |\#_0(x) - \#_1(x)| \leq 2\}$.
($\#_0(x)$ denotes the number of 0s in x).
 - $L = \{w \mid \text{decimal representation of } \textit{reverse}(w) \text{ is a multiple of } 3\}$.
- Prove that the following languages over $\{0,1\}$ are non-regular.
 - $L = \{ww \mid w \in \{0,1\}^*\}$.
 - $L = \{w \mid w = 1^k z \text{ where } z \text{ contains at most } k \text{ many 1s}\}$.
 - $L = \{0^n \mid n \text{ is a prime number}\}$.
- Prove or disprove that the following language over $\{0,1\}$ is regular:
 $L = \{w \mid w = uv \text{ where } \#_0(u) = \#_1(v)\}$
- Construct CFGs for the following languages over $\{0,1\}$:
 - $L = \{w \mid w \text{ contains equal number of 0s and 1s}\}$.
 - $L = \{w \mid w \text{ is not of the form } 0^n 1^n\}$.