

Additional Assignment

1. Design a Turing machine (TM) that accept the language consisting of all strings of 0s whose length is a power of 2.
2. Proof that the language $L = \{0^n 1^n \mid n \geq 0\}$ is not a regular language using pumping lemma.
3. For each of the following languages, construct a DFA that accepts the language. In all cases, the alphabet is $\{0, 1\}$.
 - a) $\{w : \text{the length of } w \text{ is divisible by three}\}$
 - b) $\{w : w \text{ contains at least five 1s}\}$
 - c) $\{w : w \text{ contains at least two 1s and at most two 0s}\}$
 - d) $\{w : w \text{ contains an odd number of 1s or exactly two 0s}\}$
 - e) $\{w : \text{every odd position in } w \text{ is 1}\}$
 - f) $\{w : w \text{ has length at least 3 and its third symbol is 0}\}$
4. For each of the following languages, construct an NFA that accepts the language. In all cases, the alphabet is $\{0, 1\}$.
 - a) $\{w : w \text{ contains the substring } 11001\}$
 - b) $\{w : w \text{ has length at least 2 and does not end with } 10\}$
 - c) $\{w : w \text{ begins with 1 or ends with 0}\}$
5. Construct (deterministic or nondeterministic) pushdown automata that accept the following languages.
 - a) $\{0^{2n} 1^n : n \geq 0\}$
 - b) $\{0^n 1^m 0^n : n \geq 1, m \geq 1\}$
 - c) $\{w \in \{0, 1\}^* : w \text{ is a palindrome}\}$.

Submission Deadline: 26 April 2024 till 4 pm.