

## BRAC UNIVERSITY

### CSE331 : Automata and Computability

1. Draw the state diagram of a TM that decides the following languages.
  - a.  $L(M) \rightarrow \{w \in \Sigma^* \mid w \text{ contains equal numbers of 0s and 1s}\}$ , where  $\Sigma = \{0, 1\}$
  - b.  $L(M) \rightarrow \{0^n 1^n 2^n \mid n \geq 0\}$ , where  $\Sigma = \{0, 1, 2\}$
  - c.  $L(M) \rightarrow \{0^n \mid n \geq 0\}$ , where  $\Sigma = \{0\}$
  - d.  $L(M) \rightarrow \{w \in \Sigma^* \mid w \text{ is a palindrome}\}$ , where  $\Sigma = \{0, 1\}$
2. Prove that the following languages are decidable.
  - a.  $A_{\text{DFA}} \rightarrow \{\langle N, w \rangle \mid N \text{ is a NFA that accepts input string } w\}$
  - b.  $A_{\text{REG}} \rightarrow \{\langle R, w \rangle \mid R \text{ is a regular expression that generates the string } w\}$