1. (a) Give an NFA recognizing the language $\langle 01 \cup 001 \cup 010 \rangle^*$.
(b) Convert this NFA to an equivalent DFA. Give only the portion of the DFA that is reachable from the start state.

2. (a) Let $L$ be a language comprising all strings $w$ such that $w$ contains an even number of 1s, an odd number of 0s, and no occurrences of the substring 10. Write down a regular expression that generates $L$. Justify your answer.
(b) In the C programming language, comments appear between delimiters such as /* and */. Let $L$ denote the language of all valid delimited comment strings. A member of $L$ must begin with /* and end with */ but have no intervening */. For simplicity, assume that the characters within the comments that are not / or * are only the symbols 0 and 1, so the alphabet $\Sigma$ is $\{0, 1, *, /\}$.
Give a regular expression that generates $L$.

3. Convert the following finite automata into regular expressions by means of GNFAs. Include all steps in your work.

4. Prove that the language $L = \{wtw \mid w, t \in \{0, 1\}^+\}$ is not regular.
Note: the “+” operator means one or more repetitions of the pattern.

5. Let $\Sigma = \{0, 1, +, =\}$ and

\[ \text{ADD} = \{x = y + z \mid x, y, z \text{ are binary integers, and } x \text{ is the sum of } y \text{ and } z\} \]

Show that ADD is not regular.