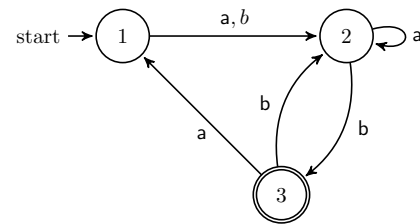
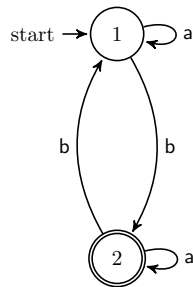


HW 2: Finite automata, regular expressions and nonregularity

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- Give an NFA recognizing the language $(01 \cup 001 \cup 010)^*$.
 - Convert this NFA to an equivalent DFA. Give only the portion of the DFA that is reachable from the start state.
- 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.
 - 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 Σ is $\{0, 1, *, /\}$. Give a regular expression that generates L .
- Convert the following finite automata into regular expressions by means of GNFA's. Include all steps in your work.



- 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.
- 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.