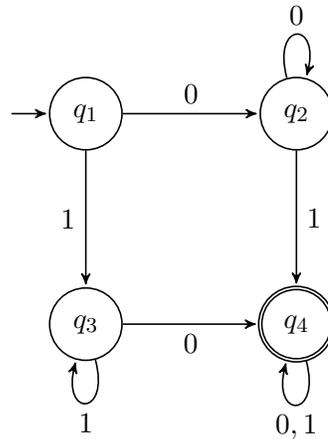**Directions:** You may work to solve these problems in groups, but all written work must be your own. See "Guidelines and advice" on the course webpage for more information.

1. Let $\Sigma = \{0, 1\}$ and let M be the automaton pictured below.

   (a) List the sequence of states of M on input 1101. Is $1101 \in L(M)$?

   (b) Give an English description for $L(M)$.

2. Let $\Sigma = \{a, b\}$. For each language A below, construct a (deterministic) finite automaton (DFA) that recognizes it.

   (a) $\{w \mid w \text{ has at most } 1 \ b\}$.

   (b) $\{w \mid \text{the number of } a\text{'s in } w \text{ is divisible by } 3\}$

   (c) $\{w \mid w \text{ has at most } 1 \ b \text{ and the number of } a\text{'s is divisible by } 3\}$.