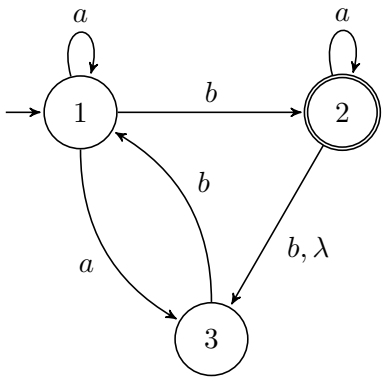
Directions: You may work to solve these problems in groups, but all written work must be your own. **Show your work**; See "Guidelines and advice" on the course webpage for more information.

1. Let $\Sigma = \{0, 1\}$. Give state diagrams of DFAs for the following languages.
   (a) $\{w \mid w$ begins with a 1 and ends with a $0\}$.
   (b) $\{w \mid w$ has an even number of 1s or contains the substring $101\}$

2. Let N be the NFA pictured below.



   (a) Which of the following strings are accepted by N? Explain. Strings: λ, b, bb, bbb, $bbbb$.
   (b) Convert N into an equivalent DFA.

3. Let $\Sigma = \{0, 1\}$, let $A = \{w \mid w$ ends in a $1\}$, and let $B = \{w \mid w$ has odd length$\}$. Construct a DFA with 4 states that recognizes the language AB. (Hint: it may be easier to first construct an NFA, convert to a DFA, and then simplify the DFA.)