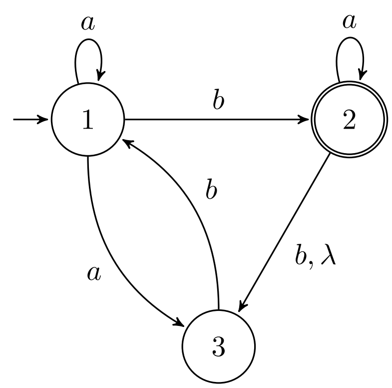
Directions: You may work to solve these problems in groups, but all written work must be your own. See "Guidelines and advice" on the course webpage for more information.

1. Let 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.

2. Let $\Sigma = \{0, 1\}$, let $A = \{w \mid w \text{ ends in a } 1\}$, and let $B = \{w \mid w \text{ has odd length}\}$. 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.)

3. Let $\Sigma = \{0, 1\}$. Let A be the language $\{w \mid w \text{ is an integer in binary notation and } w \text{ is divisible by } 5\}$. For example, 1010 represents $1 \cdot 2^3 + 0 \cdot 2^2 + 1 \cdot 2^1 + 0 \cdot 2^0 = 8 + 2 = 10$, so $1010 \in A$. On the other hand, 01110 represents $0 \cdot 2^4 + 1 \cdot 2^3 + 1 \cdot 2^2 + 1 \cdot 2^1 + 0 \cdot 2^0 = 8 + 4 + 2 = 14$ so $01110 \notin A$. Give a DFA that computes A.

4. Convert the following NFA to a DFA. Simplify if possible.