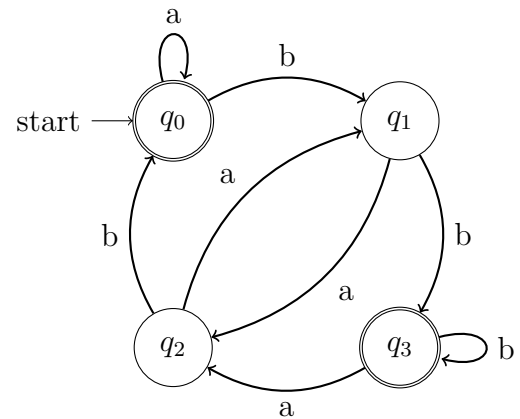


Due Monday, February 3.

1. Consider the DFA shown below.

(a) What are the sets  $Q$ ,  $\Sigma$ , and  $F$  in the formal description  $(Q, \Sigma, \delta, q, F)$  of this machine?



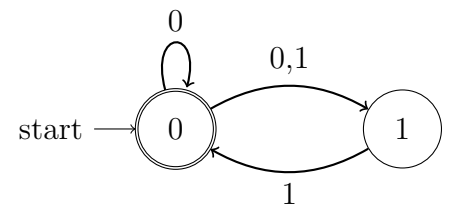
(b) What sequence of states does the machine go through on the input **aabb**aa? Does the machine accept **aabb**aa?

2. Design a DFA that outputs 1 if and only if the input length is divisible by 3. Draw a state diagram for your answer.

3. Design a DFA that outputs 1 if and only if the input begins with 01 and ends with 01. Draw a state diagram for your answer.

4. Construct an NFA with three states that accepts a string in  $\{0, 1\}^*$  iff it ends in 00.

5. Find a DFA that is equivalent to the NFA shown below.



6. Consider a DFA with states  $Q = \{0, 1, 2\}$ , alphabet  $\Sigma = \{0, 1\}$ , initial state  $q_0 = 0$ , and accepting states  $F = \{0, 1\}$ . The transition function is shown in the table below. Write a computer program that takes a string in  $\Sigma^*$  as input and prints each state the DFA enters as it goes through the input string. Your program should also return 1 if the DFA accepts the string, otherwise return 0.

$q \backslash \sigma$	0	1
0	1	1
1	0	2
2	0	0